Appendix I
Responses to Comments on the Basis of Design Report/Preliminary (30%), Intermediate (60%), and Pre-Final (90%) Design Submittals
(on CD-ROM only)

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
General Comments											
1	MWD	Non-design	Other	General		The Metropolitan Water District of Southern California (Metropolitan) appreciates the leadership and commitment from DTSC and DOI to resolve outstanding issues and to move this project forward in a timely manner. Implementing the final remedy is vital to ensuring protection of Colorado River water quality. Under current drought conditions, Metropolitan has increased reliance on Colorado River water to serve nearly 19 million residents in the southern California coastal plain.	Comment noted. PG&E concurs with MWD.		The Federal Agencies appreciate the continued involvement and support from MWD.		DTSC – Comment Noted
2	MWD	Non-design	Other	General		Metropolitan recognizes the significant efforts from all project stakeholders interested in streamlining the design review process. We are hopeful that the proposed design decision making process (i.e., RTC protocol) will ensure that all comments are carefully considered, while providing guidance for resolving outstanding design issues. We appreciate that our comments from the 60% design were appropriately addressed. In the interest of meeting the project timeline, if our new comment has already been addressed and/or incorporated, please provide a reference to the final resolution to explain if no further action will be taken to amend the final design.	Comment noted.		Comment noted.		DTSC- Comment Noted
3	MWD	Non-design	Editorial	General		Review the acceptance of edits between the Basis of Design Report/Pre-final 90% Design Submittal and the redline version of the Basis of Design Report. Check all footnote references and citations for accuracy, including footnotes 8 through 10 in the Basis of Design Report/Pre-final 90% Design Submittal.	References and citations to footnotes 8 through 10 will be revised and updated to 7 through 9 accordingly.				Comment resolved.
4	ADEQ					The installation of groundwater wells and the continued monitoring of hydraulic and hydrologic conditions and groundwater quality with respect to hexavalent chromium (Cr VI) and, more recently, remediation byproducts on the Arizona side of the Colorado River have been, and continue to be, important to this agency and others. The technical, practical, and sensitive importance has been documented previously by several entities. For the record, ADEQ supports the technical and practical components that have led PG&E to the proposed locations of MW-X and MW-Y. With the recent confirmation that the increasing concentration of Cr VI in MW-55-120 are statistically significant, ADEQ echoes the DTSC's sentiments expressed during the TWG meeting that more than two additional monitor wells on the Arizona side of the Colorado River are ideal. However, ADEQ will heed to the compromise of two additional monitor wells on the Havasu National Wildlife Refuge (HNWR) peninsula, as long as the VRP decision criteria outlined in 2007 continue to be met: • Exceedances of the total chromium Arizona Aquifer Water Quality Standard (AWQS) of 100 micrograms per liter (μg/L) do not occur; and • Cr VI concentrations are not detected above the regional natural background concentration of 32 μg/L. Once the groundwater remediation system is operational, the WRP will have additional decision criteria that will need to be met such as: • Remediation system byproducts are not to be detected above their respective AWQSs; and • Changes in groundwater quality parameters are not to be determined statistically significant. Specific groundwater quality parameters and preferred statistical analysis methods and bounds will be outlined at a later date. ADEQ acknowledges concerns expressed by the various Tribal stakeholders regarding the cultural significance of the HNWR peninsula as well as the region as a whole. ADEQ recognizes that federal agencies have primary jurisdiction over the HNWR and a decision on whether to drill on the peninsula, and where, will be made through the federal consultation and approval process. ADEQ's mission is to protect human health and the environment and requests to remain a participant in the consultation process to advocate the continued protection of our residents and environment.	Comment noted.				This RTC was discussed at the July 23, August 18, and August 26 TWG meetings. DTSC/DOI – Comment noted. The Agencies will provide final direction to PG&E with respect to MW-X and Y
5	DTSC-1	Non-design	Editorial	Certification Page		DTSC maintains that the draft design document should be certified by a licensed professional to verify that the design was prepared and considered by a professional with adequate expertise.	Agree, the certification page will be completed for the final design.	For future reference, DTSC will be requiring compliance with the California Business and Professions Code requiring name and license number for engineer in charge			Comment resolved. PG&E to add "PG&E will comply with the California Business and Professions Code" for all document submissions.

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								for draft documents or name, license and stamp for geologists on draft documents.			
6	DTSC-2	Design	Editorial			Please ensure design for the contingency Fresh Water Pretreatment System is incorporated into the site design throughout the document. PG&E can insert marker or qualifier that those parts are contingency design, but the design should be incorporated so that reviewer can see how the system is incorporated site wide.	The contingent Fresh Water Pretreatment System was incorporated throughout the documents, e.g., 90% BOD text/figures/ tables, engineering drawings (function code 13 with a marker as “contingent”), O&M Manual Volume 3 (Contingency Plan), and C/RAWP (Section 5, Construction Contingency Plan).				Comment resolved.
7	DTSC-3	Non-design	Process			DTSC observed statements in the basis of design document that referenced a final design (100%) to be prepared. Although DTSC acknowledge that a revised 90% basis of design document based on comment resolution will be produced for agencies deliberation as basis for DTSC’s CEQA evaluation and approval, DTSC did not envision that version to be called 100%, and more importantly, that there will be a follow-up comment process. Therefore, any remaining design decisions should be incorporated into the 90% for review and consideration and not deferred to the 100%.	Comment noted. Text and figures will be revised to reference the “100% design” as the “final design”. PG&E understands that there will not be a comment/ review process for the final design.		DOI envisions a DOI/DTSC review of a redline version of the 90% design package with incorporated changes. As the lead regulatory agencies, DOI and DTSC are responsible for ensuring that resolutions to comments resulting from the RTC process are appropriately incorporated into the final design package and we will review a redline to ensure this occurs. Once the agencies have accepted the redline revisions, the design package will be issued as a Final BOD/Design Submittal and C/RAWP.		Comment resolved.
8	DTSC-4	Design	Editorial and Process			In DOI and DTSC’s directive letter dated April 4, 2014, PG&E was directed to incorporate the removal of all underground utilities and infrastructures to the extent practicable at the time of remedy decommissioning and required PG&E to incorporate this directive into the decommissioning plan as part of the 90% design. Based on PG&E’s November 7, 2014 reply to Tribal inquiry on this matter, DTSC does not concur that PG&E has satisfied this directive in Attachment T to Appendix I of the 90% design. PG&E must prominently carry this directive into the remedy decommissioning and restoration plans at the end of remedy. Document revision required.	The document will be revised in response to this comment. As directed, PG&E will add a dedicated section on decommissioning in the executive summary of the BOD. The new section was provided during the 90% RTC period and included in	**Attachment A** must be revised to acknowledge agencies April 2014 direction to PG&E to incorporate the removal of all underground utilities and infrastructures to the extent			**Attachment A** was revised to address DTSC’s comment and incorporated DTSC’s edits.

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							Attachment A of this RTC table (referred to herein as the final RTC table). All attachments can be found at the end of the table. It is important to note that at this time in the design process and before the remedy is constructed, steps to decommission any remedy components, that will occur decades into the future, will have to be general and conceptual. Descriptions of the conceptual decommissioning steps provided in the 60% RTC #6 (Attachment T of Appendix I) reflects this fact. Any additional details should be considered speculative best guesses, and are subject to change at the time of remedy decommissioning. PG&E has and will continue to reiterate its commitment to remove of all underground utilities and infrastructures to the extent practicable at the time of remedy decommissioning. See also RTC #12 DTSC-8.	practicable at the time of remedy decommissioning. Citing the actual letter is requested. DTSC has also edited PG&E's August 5, 2015 **Attachment A** Decommissioning Section. Those edits should be included in the final document. Finally, a groundwater SEIR is currently being prepared and will evaluate the Tribes current desire to remove all underground utilities and infrastructures to the extent practicable at the time of remedy decommissioning. Therefore, reference in Attachment A to the 2011 EIR language regarding abandonment in place and removal of only above grade facilities will likely need to be amended in the future as part of the upcoming SEIR assessment.			
9	DTSC-5	Design	Monitoring			DTSC has made comments on the uncertainty and difficulty in estimating the number of wells this particular remedy may require over the duration of the project (e.g., see 60% design RTC 225 and 632). Even commenting on a provisional, "next step" well can be difficult (e.g., see 60% design RTC 136 and 137 regarding wells IRL 6 and 7) and DTSC is no longer pursing very detailed information for certain provisional wells as potential well locations and associated circumstances can be too variable. DTSC does believe the 10 provisional, unassigned wells called out in the 90% BOD is good planning, but realizes that it is just a place holder. Ten to twenty percent of the total number of wells may be a more realistic upper bound. DTSC reiterates that wells should be minimized on this site due to cultural concerns, but that the need for the well must be based on technical necessity.	Comment noted.				
10	DTSC-6	Design	Monitoring			The Tribes have noted concern with the presence of Monitoring Wells X and Y on the Arizona peninsula. DTSC wishes to note the importance of these wells as sentry wells for the remedy which will purposely accelerate groundwater flow towards Arizona. Fundamentals on capture zone analysis and associated sentry wells can be found in *A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems* (USEPA 2008). DTSC could not approve the remedy without sentry wells. The remedy would have to be drastically modified (groundwater flow in the area would have to move in an opposite direction - towards the west) if sentry wells were to be eliminated. These wells need to be installed early to establish baseline concentrations for water quality	Comment noted. Also note that discussion of sentry (sentinel) wells is provided in Sec 4.3.3.3 of O&M Vol 2.				This RTC was discussed at the July 23, August 18, and August 26 TWG meetings. Agencies to provide direction to PG&E based on input received.

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						constituents (e.g., baseline chromium concentrations) so any naturally occurring trends can be observed before remedy start up. This will assist in determining if the well has been adversely affected by the remedy.					
11	DTSC-7	Design	Monitoring			Lessons learned from the in-situ remedial actions at the PG&E Hinkley Compressor Station should be shared with the CWG/TWG. Tribes had requested this information and PG&E was not able to find the time to schedule it. This information would appear valuable and directly applicable to the Topock site as the contamination and remedial measures are quite similar. As PG&E has recently planned to replace fouled injection wells at Hinkley, a summary of the events that led to that decision should be discussed as wells as preventive maintenance that will be conducted at Topock to alleviate the need to replace wells so quickly. Manganese migration that has exceeded threshold limits at sentry wells should be discussed as well as the Manganese Mitigation Plan that has been developed and as of November 2014 includes active extraction and infiltration dry wells to address the exceedances. Expansion of the plume at Topock via excessive byproduct migration is unacceptable and as it would likely result in significant footprint, infrastructure and costs in order to mitigate. PG&E should identify additional Hinkley topics for discussion at an upcoming TWG meeting.	An educational webinar was held by PG&E on July 7, 2015 to provide an overview of the In-situ Remediation of chrome-six utilizing a similar technology to that under design for the Topock site, and will cover infrastructure, geochemistry, management of byproducts, rate of chromium remediation, and lessons learned.	Hinkley presentations by PG&E and the RWQCB staff on July 7 and 8, 2015 respectively were informational and appeared to be well received by Tribes, agencies, and stakeholders.			Comment resolved.
12	DTSC-8	Design	O&M			The 90% should be revised to readily indicate that all subsurface remedial infrastructures will eventually be removed as part of decommissioning and not be abandoned in place. At a minimum, a section on site decommissioning should be included in the executive summary and should briefly describe the decommissioning process envisioned for the remedy. More decommissioning details should be provided in a dedicated section even though it is understood that a decommissioning plan will be prepared much later in the remedial process. Language contained in Attachment T in Appendix I is not adequate and difficult to find. PG&E should address how certain portions of the remedy may be decommissioned prior to remedy completion if agencies believe they are no longer needed. For clarity, PG&E should list all remedial structures that they believe cannot or should not be removed at the end of the remedy. For example, will horizontal casings installed under the freeway be removed or left in place.	As directed, PG&E will add a dedicated section on decommissioning in the executive summary of the BOD. The new section was provided during the 90% RTC period and included in **Attachment A** of the final RTC table. It is important to note that at this time in the design process and before the remedy is constructed, steps to decommission any remedy components, that will occur decades into the future, will have to be general and conceptual. Descriptions of the conceptual decommissioning steps provided in the 60% RTC #6 (Attachment T of Appendix I) reflects this fact. Any additional details should be considered speculative best guesses, and are subject to change at the time of remedy decommissioning. PG&E has and will continue to reiterate its commitment to remove of all underground utilities and infrastructures to the extent practicable at the time of remedy decommissioning. A conceptual list of	PG&E should note that portions of the remedy may be decommissioned prior to remedy completion if agencies believe they are no longer needed. See also response to RTC # 8.			See RTC #8 DTSC-4. Comment resolved.

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							remedy features that may not be removed was provided in the executive summary as directed. The new decommissioning section also mentioned that a future Bird Impact Avoidance and Minimization Plan will be prepared (prior to decommissioning) based on surveys conducted prior to decommissioning.				
13	FMIT	Design and Non-design	General	Also, in reference to ARAR Table 6.2-1		The Project burdens the traditional religious practices of the Tribe. The burdens are not merely defined by restrictions to physical access and such intrusions as visual and auditory insults to the Tribal members, but includes the continuing and now expanded degradation and desecration of the Traditional Cultural Landscape. The Agencies and design documents should more fully reflect the breadth of the statutes (including RFRA and AIRFA) and the Project's impacts on the Tribe. As reflected elsewhere, consultation under the NHPA continues to be mostly about producing documents, rather than focusing on process inclusion of the Tribe in actual decision-making. Some recent efforts to consult with the Tribe on the continually expanding scope and intensity of impacts is appreciated, but has not been reflected in the design documents.	PG&E defers to the agencies on consultation with Tribes.	Tribes have been consulted throughout the remedy selection and design process. This remedy was specifically recommended by FMIT as compared to other technologies evaluated. Tribal input have been incorporated into the design including injection and monitoring well locations, pipeline alignments, soil storage and staging areas, access routes, etc.	DOI and BLM acknowledge that the site investigation and remediation activities will have an adverse effect to the Traditional Cultural Property from these actions. However, DOI and DTSC, as the regulatory agencies responsible for cleanup, are the decision makers on the project and disagree that the Tribes have not had many opportunities to provide significant input to the agencies. Tribal input is always taken into consideration before decisions are made by BLM and DOI. Design changes have been included at each phase of the process based on input from the Tribes. Furthermore, the BLM is exploring a National Register nomination for the Topock TCP (in response to unavoidable	In its response, DTSC maintains that the "… remedy was specifically recommended by FMIT as compared to other technologies evaluated. Tribal input have [sic] been incorporated into the design including …" This is misleading. First, the Tribe's preferences in regard to the nine alternatives presented in the CMS/FS document were clearly outlined in a comment letter dated February 26, 2009. In that letter, the Tribe clearly expressed its preferences among the alternative remedies in terms of priority. The Tribe's first preference was Alternative A ("No Action" or "Natural Attenuation"). Second was Alternative B ("Monitored Natural Attenuation"). After that, and in consideration of PG&E's preference for Alternative E ("In Situ Treatment with Freshwater Flushing") and believing that this technology would be the least disruptive of the engineered remedies to Tribal interests based on the information presented in the CMS/FS, the Tribe agreed that it could support Alternative E, as	Once again Agencies would like to affirm our commitment to continue working with all Tribes and Stakeholders to see that the cleanup is accomplished in a manner that minimizes impacts to cultural and religious values and resources as well as biological resources.

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									impacts) and are consulting with tribes on the National Register eligibility of the Clay Gathering Area -- all in response to purported impacts to their sacred landscape. The BLM has been following the guidelines documented in the CHPMP and PA which require that sites be evaluated for the National Register if they cannot be avoided. Thus in such cases a report must be produced and tribes must be consulted. Additionally, all cultural documents are reviewed by Tribes and their concerns are factored into revisions. Tribes were also heavily involved in the development of the Programmatic Agreement although only one tribe signed the document. The agencies hope that all Tribes are more involved during the upcoming revision of the Cultural Historical Property Management Plan (CHPMP). The remedy must be implemented in a timely fashion and we will continue to work with all Tribes and Stakeholders to see that this is accomplished in a manner that minimizes impacts	then proposed. For example, the Tribe clearly expressed a preference for above-ground piping installations, a design detail which we are now informed will not be implemented for various reasons. And in fact, Alternative E, during the progression from 30% to 60% to 90% design, has significantly increased in complexity and associated impacts, as reflected by the need for a Subsequent EIR. Second, it may be true that certain preferences of the Tribe have been incorporated into the design on a selected basis, some of the most significant and impactful ones remain such as underground utilities and MW-X and MW-Y sitings. Indeed, some of these have been characterized in the CEQA process as significant, unmitigable and irreversible. Further, DOI also acknowledges that "… the remedial activities will have an adverse effect to the Traditional Cultural Property …." Accordingly, it is misleading and disingenuous for DTSC to make such a blanket claim that it has incorporated the Tribe's input into the design, when changes that would reduce significant religious and cultural impacts were not adopted and the project has substantially evolved from that originally proposed and approved. More generally, both the DTSC and DOI responses sidestep the thrust of the Tribe's comment regarding how the project will limit its ability to exercise and	

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									to protect cultural and religious values and resources as well as biological resources.	enjoy religious freedoms guaranteed under Federal statutes. The Tribe acknowledges that certain design changes have been made on a selective basis, however many of the more impactful features of the design have not. Overall in most instances, the response clearly reflects single-mindedness in achieving technical objectives without commensurate consideration of important cultural issues, whenever such matters come into conflict.	
14	FMIT	Non-Design	CEQA/EIR			The documents still do not set out the *process* as to how CEQA and other environmental review requirements will be met when changes occur during the decades-long operation of the remedy. Nor is there a description as to how the tribes will be appraised of proposed or actual changes and how the tribes will be meaningfully included in the environmental review to determine whether potential impacts, both individually and cumulatively, are significant (This is an open issue that was be carried forward from the 60% BOD to the 90% design.)	PG&E defers to DTSC for response to this comment.	CEQA evaluates the potential environmental impacts of a project in totality. That is why CEQA evaluations use conservative, but realistic estimates, of the project activities during its evaluation. Future allowable modification of the project will be bounded by the scope of the impacts evaluated in the completed CEQA document for the project. Changes with impacts beyond those evaluated in the completed EIR review will be separately evaluated after PG&E puts forth a change proposal and discussion with agencies. DTSC will comply with the requirements of CEQA. Tribal involvement will be maintained through our standard periodic meetings (e.g. CTF, CWG, and TWG) and any other required outreach		Thank you for the commitment to continue Tribal involvement throughout the project. We also note that any environmental review considered after July 1 2015 will need to comply with the provisions of AB 52 (Gatto). The Tribe requests that AB 52 consultations occur with FMIT for all work related to the remediation effort. Please consider also the response at RTC #29 FMIT- 15.	DTSC response: Request noted. DTSC will comply with applicable and relevant requirements of AB52 as procedures are developed by the Governor's Office of Planning and Research and DTSC, as applicable to the project.

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								under CEQA requirements. There is no plan to dissolve or end the current periodic meetings. Tribal involvement will be extended through field monitoring opportunities pursuant to mitigation measures, and SOPs (e.g. well screen calls). Currently, agencies cannot foresee any significant project changes that the Tribes would not be notified or be a participant in its decision making process based on existing meeting and input structure provided in the 90% design document.			
15	FMIT-1	Non-design	Other			On April 4, 2014, the Agencies issued final directives to PG&E on "outstanding issues of the response to the 60% BOD report." Among the "outstanding issues" was whether the pipeline would be designed as a buried or above-ground facility. The Agencies ultimately directed PG&E "to continue to design the pipeline system for below ground pipeline placement, following the alignment in PG&E's 60% Design proposal." This decision purportedly was based on input received from PG&E, the Tribes, and [unidentified] stakeholders as well as other such significant criteria as ecological impacts, construction impacts and long-term maintenance and safety concerns." The letter states that [FMIT[1]] expressed "... a *revised preference* for below ground piping for the area adjacent to Maze Loci B ... [and] a preference for aboveground placement of the remaining portions of Pipeline A." [Emphasis added.] These statements grossly misrepresent and deemphasize FMIT's position as stated in the March 6, 2014, cover letter as well as the conditions of use comments in Enclosure A of that letter. First, the March 6 cover letter clearly states that "... the comments and preferences as expressed in [this letter] do not in any way constitute an endorsement or acceptance of the design ... many of the adverse impacts associated with this project are permanent and irreversible." However, after several meetings and site walks, the Tribe yielded to the persistent arguments of PG&E regarding asserted "safety issues" associated with an aboveground pipeline along this route, as well as to the realization of potential further damage to *in situ* materials that could result from road cuts that might be necessitated by placing above-ground infrastructure on an access route. Accordingly, after re-iterating its preference for above-ground routing, FMIT yielded to an *acceptance* of the proposed below-ground construction, with the conditions that: (1) no further disturbance would occur to the *in situ* materials on either side of the roadway, and (2) all below-ground piping be removed after remedy completion. And, as correctly indicated in the Agencies' letter, FMIT did express preference for aboveground design, with the exception of the spur piping to IRL-4.	PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.	DTSC would like to thank the Tribes for their continued input on this investigation and cleanup project. DTSC understands through repeated statements by the Tribes that this area is culturally and spiritually significant. Contrary to Tribal perceptions, inputs from the Tribes weigh heavily in DTSC's decision process. DTSC considers many criteria in our decision including long term maintenance, health and safety, visual impacts, as well as cultural impacts. That is	DOI and BLM met with the Tribes on several occasions regarding the pipeline placement and considered aboveground pipeline segments as design options. DOI developed a pipeline matrix to assist in the analysis of each segment in determining whether the above ground option could be considered. DOI and DTSC directed PG&E to further analyze options for aboveground versus below ground placement for each main segment of the pipeline. PG&E	As claimed by DTSC, can the agency cite one important example of how Tribal input has weighed "... heavily in DTSC's decision process?" [Emphasis added.] There has rarely been any discussion with the Tribe of the weighing of various factors, on summary conclusions that the Tribe's input was considered. With particular regard to the decision on the installation of proposed monitor wells MW-X and MW-Y in Arizona, which are sited on the cultural property known as Amut ahar, the Tribe has taken all reasonable measures to objectively assess the technical need and justification for these wells, including	Please see Agencies' direction letter dated April 4, 2014, on above ground/ belowground pipeline infrastructure. DTSC/DOI – In response to the yellow highlighted section, PG&E must also include language in the Executive Summary that they will work with landowners on decommissioning preferences.

[1] Referencing letter from Dr. Leo S. Leonhart, Hargis + Associates, Inc., on behalf of FMIT to Mr. Aaron Yue, DTSC, and Ms. Pamela Innis, DOI, re "Fort Mojave Indian Tribe Comments on Alternative Pipeline Routings and Proposed Soil Storage/Staging Areas for the Topock Compressor Station 60% Groundwater Remedy Design," April 6, 2014.

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						FMIT further notes that the Agencies' letter also misrepresents the March 10, 2014, letter[2] from the Hualapai Tribe, and the March 13, 2014[3], letter from the Cocopah Tribe, both of which indicate a preference for above ground placement of the last portion of the pipeline route from IRL-3, west along former Route 66 to FW-1 ("F to H to I"). The Tribe has repeatedly appealed for above-ground infrastructure, both verbally and in numerous written comments and letters regarding the 30% and 60% design documents. This preference is rooted in the need to protect the sanctity of the sacred landscape and preserving it for future generations. Contrary to the Tribe's appeals, the present design for the remedy calls for *nearly the entire pipeline routing*, roughly *5 linear miles* to be placed below ground. This decision raises the question as to the *specifics* of the Agencies' criteria apart from the generalities mentioned above that override FMIT's expressed preferences. And it further raises an issue as to whether there were individuals responsible for weighing in on cultural matters involved in such decisions. And finally, what level of commitment there is to completely remove the pipeline once the remedy is completed and how enforceable is that commitment?		why DTSC expended much resources and efforts to meet and discuss these matters with Tribes to seek resolutionAs claimed by DTSC, can the agency cite one important example of how Tribal input has weighed "… heavily between parties. In response to Tribal concerns, agencies directed PG&E to prepare visual simulations of pipeline options which were discussed at several meetings. Ultimately, however, the agencies must make a decision to move forward with the project, even though the decision may not be satisfactory to the Tribes. In the case of the various segments of piping, DTSC understands that the Tribes acknowledged PG&E's needs to install the pipelines underground and that there would be greater disturbance with piping located below ground. DTSC has also requested PG&E to commit in the design document to remove all infrastructures at the end of the remedy.	provided a detailed comparison that is included in the 60% Design Response to Comment. Additionally, visualizations were made for the segments and presented for discussion at the meetings. The Agencies considered all input in their direction to PG&E. We do acknowledge the Tribes preference for aboveground piping however, when considering safety and constructability, visual impacts, impacts to undisturbed areas, potential impacts to biological resources, as well as impacts to the cultural area, our direction to PG&E in our 4/4/14 letter was to carry forward the below ground placement of the pipeline system in the 90% Design, following the alignment in PG&E's 60% Design proposal. Our direction specified that, based on additional input from the Tribes, PG&E shall remove all underground utilities and infrastructures to the extent practicable at the time of remedy decommissioning.	engaging the expertise of the TRC, including the TRC's presentation of a some 60-page white paper, which proposed a program of further testing and evaluation that could address the suitability of the well sites. While the decision remains under consideration, it appears that PG&E has essentially rejected the findings of the white paper and its recommendations, based on limited findings that were never intended to address the specific matter of the wells. It is hoped that the agencies will give due consideration to this good faith analysis. In its response, DTSC asserts that "Ultimately, however, the agencies must make a decision to move forward with the project, even though the decision may not be satisfactory to the Tribes." This language seems to imply that the Tribe is in some way opposed to implementing a groundwater remedy. This is not at all the case. Indeed, the Tribe is extremely concerned over the level of contamination that has been spread throughout the site and its sacred lands. Accordingly, the Tribe represents and speaks for the lands, animals, plant life and all things above and below ground and presents comments to make PG&E and the agencies aware of the nature of its disturbance and requests various design modifications to lessen	

[2] Letter from Ms. Loretta Jackson-Kelly, Hualapai Department of Cultural Resources, to Mr. Aaron Yue, DTSC, and Ms. Pamela Innis, DOI, re "60% Pipeline and Soils Staging Matrices," March 10, 2014.

[3] Letter from Mr. Edgar Castillo, Topock Project Manager, to Mr. Aaron Yue, DTSC, and Ms. Pamela Innis, DOI, re "60% Pipeline and Soils Staging Matrices," March 13, 2014.

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PG&E Topock Compressor Station, Needles, California

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								Finally, DTSC does have cultural resource experts that provide us with input for consideration in our decision making.	See also RTCs #36 FMIT/TRC, #37 Hualapai/TRC, #38 Cocopah/ TRC, and #39 Chemehuevi/ TRC.	its impacts on the TCP and in concert with the PA, CHPMP, CIMP and related documents that state "Avoidance" is the first consideration. Both responses also seem to prioritize visual impact reduction over reduction to other cultural aspects prioritized by the affected community - the Tribe. Relative to the direction of infrastructure removal at time of decommissioning, the Tribe remains concerned about the enforceability of "to the extent practicable" and requests that some performance criteria to determine practicality be considered and adopted prior to final design acceptance. Please see RTC #16 FMIT-2.	
16	FMIT-2	Non-design	Other			As was further expressed in FMIT's letter of March 6, 2014, the March 10, 2014, Hualapai letter and the March 13, 2014, Cocopah letter, any below-ground piping should be removed following the remedy completion. And indeed, this was called for in the April 4, 2014, letter from DTSC/DOI to PG&E. Specifically, PG&E was directed to "... remove all underground utilities and infrastructure to the extent practicable at the time of remedy decommissioning. This directive shall be incorporated into the decommissioning plan as part of the 90% Basis of Design." ~~[Emphasis added.]~~ Despite this directive and contrary to comments made by the FMIT, CRIT, Hualapai, Chemehuevi, and Cocopah Tribes, PG&E apparently believes that it has fully responded to this issue, referencing a narrative presented in Attachment T (to the RTC). However, in regard to "System Components Decommissioning," this narrative provides for either removal or abandonment in place as part of the decommissioning. There is no explicit commitment to actually remove underground infrastructure, as DTSC and DOI directed and as the Tribes' requested. Thus we assume that PG&E prefers that the ultimate decision, which will occur tens of years after construction, remains solely within its own discretion. This is unacceptable to FMIT. Perhaps one reason why PG&E feels it has the freedom to provide only a vague commitment at this time is the qualification "to the extent practicable" in your letter. The Tribes' letters made it quite clear that complete removal is expected. As to practicability, if there are compelling reasons why removal is not practicable, then this needs to be justified in detail in the narrative and performance criteria outlined, and must be consistent with all requirements of California Environmental Quality Act ("CEQA") and the National Environmental Policy Act ("NEPA") equivalent analysis. Moreover, if there is reasonable justification as to the impracticability, then such disclosure needs to be made now. Also, an enforceable commitment must be made that the Tribes will be brought in for consultation prior to abandonment. Again, I wish to remind you that the Tribe will be resident in the Mojave Valley, our historical and cultural homeland, well into the future, far beyond the implementation of this Topock Project. It is therefore critical that the full and proper design, implementation, and decommissioning be established at this time so that our – and your – successors understand how to proceed in the future. This process needs to be spelled out now in the final remedy document to better reflect the Tribe's understanding of this agency directive, not down the road when most of us will no longer be part of the project and left to someone else's interpretation. Fort Mojave will be here still overseeing this	Please see RTC #12 DTSC-8. DTSC and DOI have the ultimate decision making power over the Project and its decommissioning, including the removal of remedy facilities. PG&E understands the Tribes expect "complete removal." PG&E is committed to following the agencies' direction regarding removal in the April 4, 2014 directive letter. As noted in RTC #12 DTSC-8, decommissioning will occur decades from now. PG&E will follow the state and federal requirements that apply to the Project during decommissioning. These requirements include the EIR		Section 5(A) of the Programmatic Agreement (PA) states that "All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. All such removal will be planned in consultation with the Signatories, Tribes and Invited Signatories, following the guidelines in Appendix B." DOI and the Bureaus , along	As discussed in recent meetings of the TWG, the Tribe understands that a commitment to remove ALL infrastructure as part of decommissioning may not be practicable or may cause more disruption than leaving it in place. However, the Tribe believes from the examples cited in the TWG, this represents more of an exception than a rule. The Tribe understands that it may well be the Agencies decision as to the final disposition of the infrastructure, but notes that PG&E's statements in the BOD lacked firm commitment, and that the direction received from the Agencies on April 4, 2014, was rather explicit in this regard as referenced in the comment. and must be fully and accurately reflected in	A dedicated section (see **Attachment A** of the final RTC Table) that describes the decommissioning process envisioned for the proposed remedy will be added to the Executive Summary of the Final BOD. This RTC was discussed at the August 19 TWG meeting. See final resolution in comment 15 above.

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						cleanup for many generations to come, we need an enforceable removal process and criteria in place now as part of the remedy design documents.	mitigation measures, the PA, and the CHPMP. PG&E does not currently know whether it will be infeasible to remove certain remedy components and cannot provide the Tribes with such information. Any guess regarding future conditions that may make complete removal of the remedy infeasible would be just that—a guess. A more detailed decommissioning plan will be prepared in the future, and will address the feasibility of removal of remedy infrastructure.		with DTSC and PG&E, will evaluate the removal of infrastructure in the decommissioning plan to determine if doing so is protective. As stated in part D of this same section, prior to decommissioning of any remediation facility, the Federal Agencies will consult with all Signatories, Tribes and Invited Signatories during the development and review of related plans.	the final design and CEQA documents. Also, as a landowner the Tribe must be consulted on what happens on its land and requires that at the end of the remedy that all features of the final remedy be removed from its property. The Tribe, as landowner, not the agencies or PG&E, shall determine what "to the extent practicable" means to their respective management practices at project decommissioning especially on lands owned by the Tribe.	
17	FMIT-3	Non-design	Other			It has been eight years since the Tribe submitted a letter to the Arizona Department of Environmental Quality (ADEQ) regarding PG&E's plans to construct wells on the Arizona shore. At that time, the Tribe expressed serious concerns about the plan and opposition to the proposed installation of a well in the area then referred to as "Site 1." Site 1 was characterized at the time as "sensitive," and part of a named Mojave sacred place known as Amut ahar (White Clay). It is the area below the present land surface that relates to the named sacred area, including sediments below this area and any previously dredged areas. Any consideration of wells or other components in this area- also must be consistent with all requirements of CEQA, NEPA-equivalent analysis and the National Historic Preservation Act ("NHPA"). Nothing has changed to amend that characterization of the sacred area. On April 16, 2007, Tribal representatives met with representatives of ADEQ and the Arizona State Historic Preservation Office ("Arizona SHPO") to further discuss this issue. This resulted in Arizona SHPO's transmittal of a letter to ADEQ affirming that the proposed Site 1 was indeed a named traditional historic place and opining that "... the construction and monitoring of these [proposed] drill sites would negatively impact the characteristics that make these properties eligible for inclusion in the State Register of Historic Places." In turn, ADEQ transmitted a letter to PG&E, emphasizing the Tribe's objections, particularly to the Site 1 location. Despite the finding of Arizona SHPO, the BLM subsequently issued an opinion that the proposed drilling at Site 1 "... would result in No Adverse Effect to sites listed or eligible for listing on the National Register of Historic Places." It is interesting to examine the events leading to this conclusion. Specifically: • BLM met with FMIT on July 17, 2007, to argue that the Site 1 area was "under water" until the U.S. Bureau of Reclamation placed dredge materials there in 1962. • Following this, BLM asserted it did not hear further from FMIT re its and therefore BLM was uncertain as to whether FMIT maintained its position and did not consult further with us. • BLM claims to have conducted further research as to whether "... Site #1 was in the vicinity of any known gathering place," but failed to make such a determination to our knowledge. The source and outcome of the "research" remain unidentified to us. • On September 7, 2007, BLM claims to have met with representatives of the Colorado River Indian Tribes ("CRIT") from the Topock and Golden Shores vicinity. BLM claims that the CRIT representatives "... informed the Federal agencies that there are no sites of traditional or cultural use or importance in the vicinity of Site #1 to the Mohave [sic] people, at least historically." On March 6, 2008, FMIT Chairman Williams wrote again to BLM pointing out serious shortcomings in the NHPA Section 106 consultation process and the fact that the BLM had been rather	PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.	DTSC thanks the Tribe for adding some detail and clarifying the Tribes concern with the area in question. DTSC is aware that the Arizona SHPO had requested information from the Tribes and on February 4, 2008, SHPO concluded that no substantial information was provided to support the Tribes position. DTSC is also aware that the Arizona SHPO is currently recommending additional consultation on the installation of wells X and Y. DTSC strongly disagrees with the Tribes portrayal that the Arizona wells lack technical basis. DTSC offers the following discussion to hopefully clarify the misconceptions. For this remedy, wells MW-X and	DOI disagrees with the Tribe's characterization regarding the consultation related to the installation of wells at Site 1 in 2008, as set forth in the FMIT's comment. In 2007 through 2008, BLM engaged in extensive consultation with the Tribes regarding Site 1. On many occasions during this time period, BLM requested from the Tribes information that might support the eligibility of Site 1 for the National Register. On January 24, 2008, BLM concluded that "DOI/BLM does not currently have evidence that the vicinity of Arizona Well No. 1 contains any documentable historic properties eligible for inclusion on the	As discussed thoroughly during the TWG RTC review process, the Tribe understands the position as presented by PG&E with regard to the need and basis for siting the monitor wells MW-X and MW-Y on the Arizona shore. Likewise, the Tribe hopes that the Agencies fully understand and appreciate the Tribe's opposition to the intrusion onto that culturally-sensitive area. Moreover, the Tribe hopes that PG&E and the Agencies will some objectively consider (1) the possibility that further analysis on this issue is warranted as presented in the TRC's "White Paper," and (2) some thinking "out of the box" as to the possibility of some alternative for assessing the effectiveness of hydraulic capture of the remedy, noting that the purpose of the monitor wells is to provide a	This RTC was discussed at the July 23, August 18, and August 26 TWG meetings. DTSC/DOI response to highlighted section: The rational of the proposed MW-X and Y wells has not been to address some future contingency. As explained in various meetings with the Tribes, the purpose of those wells is to directly monitor the down gradient effect of the remedy. Nevertheless, in deference to Tribal cultural concerns, The Agencies have considered the various proposal made by the TRC on behalf of the Tribes to further evaluate the geological understanding of the area prior to making a decision on the installation of MW-X and Y. Our direction letter to PG&E will lay out our expectations.

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						confrontational with the Tribe, "challenging and den[ying] [the Tribe's] beliefs and concerns," and requesting further consultation on the matter. And on March 7, 2008, FMIT legal counsel wrote to the Advisory Council for Historic Preservation ("ACHP") requesting full review of the record and consultation with the Tribe and BLM on the matter. Finally, on March 10, 2008, the Yavapai-Prescott Indian Tribe ("Yavapai') sent a letter supporting FMIT's position in regard to the Site 1 drilling. Ultimately, PG&E proceeded to construct the wells in 2008 over the Tribes' objections and contrary to the recommendations of Arizona SHPO and ADEQ. And among the approvals and authorizations they cited was the May 10, 2007, letter from ADEQ, without mention of the discussions and proceedings that occurred subsequently. Despite the flagrant disregard for the Tribe's legitimate concerns and the misrepresentation of approvals from the State of Arizona, PG&E is now planning the construction of two additional wells in Arizona to the north of the location of monitor well MW-54 (at Site 1), an area which is still within the sacred place affirmed by the discussions with the Arizona SHPO back in 2007. FMIT has made the CWG aware of this fact during recent meetings. Additionally, the Tribe has discussed this with DOI in the context of the Cultural and Historic Property Management Plan (CHPMP) meetings and consultations as recently as February of this year. Still it seems that both the Agencies and PG&E remain steadfast in their position as to the necessity of constructing wells at these locations, notwithstanding the significant adverse impacts and lack of valid supporting technical and environmental analysis. The Hualapai Tribe requested that the TRC perform a technical evaluation of the need for MW-X and MW-Y. In summary, the TRC has concluded that the need for these wells in the proposed locations is not justified on technical grounds. Specifically, the TRC notes that the proposed locations might be too far north to capture any potential migration of hexavalent chromium ("Cr(VI)"). While DOI has argued that the modeling shows a pathway toward these locations in the event of a contaminant (Cr(VI)) breakthrough, the TRC points out that the model may be flawed in regard to discretization of hydraulic conductivity values beneath and adjacent to the River. Accordingly, in the opinion of TRC, the groundwater flowlines from the California side would deflect further to the south. The 90% BOD states that the purpose of monitor wells MW-X and MW-Y is to address a contingency involving the detection of elevated concentrations of Cr(VI) at those locations. As expressed in the strategy, if such conditions were to arise, it would trigger a discussion as to a need to construct additional slant wells under the river. The Tribe's review of the documents failed to reveal any other rationale explaining why such a contingency would be realistic, particularly considering that the design concept involves the line of In-Situ Reactive Zone ("IRZ") wells and a line of River Bank wells, both intended to intercept the eastward movement of the Cr(VI) plume, and additionally the expectation that the floodplain will be cleaned up in a rather short timeframe, based on model simulations. Moreover, this does not account for known information about the reductive properties of the naturally-occurring "rind" of reducing sediments that envelopes the River as well as the fact that, in the time it has been monitored, Cr(VI) has not been detected in the River. Finally, if Cr(VI) has not been detected in the River or at monitor well MW-54 on the Arizona shore, with riverbank extraction, it would be even less likely that there would be plume migration beneath the River from west to east into the area of the proposed MW-X and MW-Y monitor wells. At the recent CHPMP meeting, DOI indicated that it was concerned about using the MW-X and MW-Y wells also to monitor hydraulic capture of the plume. This was presented in the context of gradient control in reference to the hydraulic effects of the River Bank extraction wells and the pumping at freshwater well HNWR-1A. Certainly, this is an effect that should be first examined using simulations. Also, a notion of the drawdown effects can initially be gained from monitoring wells MW-54 and the TCS wells 2 and 3. Further, given the large surface water body between HNWR-1A and the proposed monitor wells MW-X and MW-Y locations, it is quite likely that any drawdown associated with pumping of HNWR-1A would likely be dampened by the constant recharge source short of the radial distance to MW-X and MW-Y. The above-referenced section of the 90% BOD indicates that PG&E held discussions with the Agencies regarding this technical issue during the development of the 90% BOD report. Presumably other issues important to the Tribe were discussed during this timeframe as well. The Tribes should have been included in such discussions. In summary, the Tribe asserts that the construction and monitoring of wells MW-X and MW-Y would be impactful to the cultural and religious values of the landscape.		MW-Y are a critical part of the monitoring program. DTSC would be extremely reluctant to approve the remedy design without them. The reason is that PG&E's remedy intentionally accelerates groundwater flow to the east towards Arizona. This is in direct opposition to the current interim measure which pulls outboard contamination back to the west towards California. So wells MW-X and Y are proposed to monitor the outboard, downgradient portion of the remedy and make sure untreated chromium contamination does not escape the remediation zone and continues on towards Arizona. Additionally, the wells would also be monitored for byproducts (e.g., arsenic, manganese) that would be generated by the remedy's in-situ treatment zone. USEPA's 2008 guidance document titled, Systematic Approach for Evaluation of Capture Zones at Pump and Treat System, refers to these types of monitoring wells as, "sentinel wells". Without these sentinel wells, there would be no direct way to confirm that the Arizona	[National Register]." The Arizona SHPO then concurred with the January 29, 2008 BLM finding of "no historic properties affected" in their correspondence of February 4, 2008 (see **Attachment B** of the final RTC table). As BLM explained in a February 29, 2008 letter to the FMIT, it is problematic to define the area as a Traditional Cultural Place (TCP) when insufficient information regarding discrete boundaries and locations has been provided by Fort Mojave Indian Tribe. However, in response to the Tribes concerns with proposed well MW-X and -Y, BLM has re-initiated consultation on the proposed Arizona wells to evaluate the National Register eligibility of the area. Related to this action, on May 1, 2015, BLM sent a letter to the Tribes requesting that the information needed to further evaluate the clay gathering area be provided by mid-July. It should be noted that Arizona Department of Environmental Quality (ADEQ)	contingency for another contingency in order to determine whether a further contingency may be necessary. As also discussed during the TWG, the Tribe does not approve of any new wells on the peninsula. While one well is better than two, no wells are better than one. Monitor well MW-54 is already on the peninsula. Moving MW-Y to the road is better than at its proposed location, but still represents an intrusion into the area and the important strata at depth. Fort Mojave provided a letter dated July 10, 2015, to BLM Field Manager, Kim Liebhauser related to adverse effects to cultural properties related to the siting of proposed Monitoring wells, which further supports its evidence of Amut ahar, a named Mojave place and the Traditional Cultural Area (TCA) elated to the lower river region of Mohave Valley, AZ. A response from BLM and in consultation with AZ SHPO is still pending. While the Tribes understand that wells maybe important to control the spread of the contamination, the reasoning used for the need of these wells has not been provided beyond the need to support the model, which is insufficient justification for the permanent adverse effects to this area and the TCP in general. There needs to be concrete justification and an exhaustion of other methods to	DOI/BLM will continue to consult with the Tribes on this issue until a final decision is made. It is important to note that DTSC does not completely agree with the technical basis or statements made by the TRC in their white paper and their rebuttal to PG&E's response. However, for the purpose of promoting progress on this project, DTSC will not debate those disagreements here.

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						Moreover, the purpose of and technical justification for these wells has not been well established, and therefore the Tribe is opposed to their emplacement at the proposed locations, which are within both a named place, a Tribal sacred area and, within the Havasu National Wildlife Refuge.		groundwater is adequately guarded and if the assumptions used in the design are correct. In addition to monitoring for contaminant data, the proposed wells would also monitor hydraulic data and determine if the groundwater flow in the area responds to the remedy as anticipated. The current level of understanding of groundwater flow in Arizona is minimal (e.g., many monitoring wells exist on the California side, yet only two monitoring locations – MW-54 and MW-55 – currently occur in Arizona that allow for collection of reliable water level measurements). Data obtained from the Arizona wells would be incorporated into the groundwater model to improve its predictive capabilities. It is important to note that Arizona Department of Environmental Quality (ADEQ) sent a letter to DTSC and DOI on March 26, 2015 supporting the importance of these sentinel wells as part of their design review comments. Finally, as echoed in the PG&E Topock March 18, 2015 Technical Work Group Meeting,	(letter to DTSC dated March 26, 2015 on the 90% BOD) has pledged its support for the "technical and practical components that have led PG&E to the proposed locations of MW-X and MW-Y". DOI and BLM will continue to consult with the Tribes and AZ SHPO in resolving this issue and anticipate further technical discussions during 90% Design comment resolution.	secure similar data for the placement and number of wells in this location that is shown to clearly outweigh the impact to the sacredness of the area.	

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								many more Arizona monitoring wells would be added to the monitoring program for this type of remedy as standard practice absent Tribal concerns. DTSC believes that MW-X and MW-Y represent the minimum number of wells the agency believes would be necessary for the monitoring needs of the remedy.			
18	FMIT-4	Non-design	Other			In its March 6, 2014 letter[4], the Tribe provided a table summarizing the acceptability of, and concerns about, PG&E's proposed staging areas and soil processing and soil storage areas. The table provided by the Tribes' indicated the preference and acceptance (or non-acceptance) of each of 29 areas proposed for such purposes with specific conditions for use. Based on various discussions and site walks to each of these areas, the Tribe has, at multiple times and specifically in their comment letter, expressed strong objections to the use of Areas 6, 7, 12, and 13, which are so-called "upland staging areas." In the April 4, 2014, joint letter from DOI/DTSC[5], PG&E was directed "... to consider all the information in the [Tribes'] revised matrix, communications from the Tribes in meetings, and design comments to identify the minimum number of preferred storage and staging locations necessary in the 90% design for the Agencies [sic] consideration." It has been argued by others that these areas underwent prior disturbance, and therefore potentially represent areas that may be preferable to other, undisturbed areas. However, the Tribe has surveyed these proposed work areas, and, despite past desecrations, noted that these areas continue to hold tribal cultural significance and values, and conclude that further disturbances are unacceptable. In fact, the Tribes have yet to hear from BLM as to the disposition of their original Tribal Cultural Values Assessment (TVCA) report and the acceptability of the alternative methodology proposed by the Tribes' to document their findings. Also, amongst these areas is the location of an "Exclusion Area" which encompasses areas 6 and 7. Most of the areas identified in the TCVA, should fall under new discoveries in the already accepted and approved PA and CHPMP documents. This must be resolved prior to the final remedy design acceptance and approval by the agencies. It appears that Areas 6, 7, 12, and 13, despite the Tribes' preferences and the direction from DOI/ DTSC, still remain under consideration by PG&E.[6] However, PG&E included an evaluation of options that could be employed in lieu of using these areas. The Tribe, a landowner, strongly prefers the implementation of "Alternative Approach Option 1" as described in Table 1 of that evaluation, and under its rights as a landowner objects to the implementation of any other alternative. Under a 2006 Settlement Agreement with the Tribe, PG&E has expressly agreed to "honor Tribal concerns to the maximum extent practicable." (2006 FMIT-PG&E Settlement, Sec. VIII.A.) As to FMIT property, an easement agreement, recorded in 2006 pursuant to that same settlement, only grants rights to PG&E for the purpose of "conduct[ing] its legally-required Remediation" including, among other things, "to install, access, use, operate, maintain, modify, upgrade and remove any and all additional Remediation-related Facilities required by the DTSC or another agency or governmental body with jurisdiction over the Property or the Remediation." Thus, Tribal concerns must be honored to the maximum extent practicable and, as to FMIT	PG&E has participated in discussions with the agencies and Tribes, including the FMIT, on this topic at several TWG and other meetings and site visits since March 2013. In response to comments from Tribes and DOI and through further discussions to resolve these comments, a number of the proposed staging and soil storage areas were removed from further consideration. PG&E thoroughly evaluated alternative approaches to avoid the use of the proposed Upland areas, which the FMIT objects to, but the alternatives would have adverse effects on worker safety, and public safety, and create potential nuisances, environmental impacts, and construction schedule delays that would outweigh the benefits of eliminating those areas. Use of the Upland areas (Areas #6, 7, 12, and 13), which are in close proximity to the	DTSC understands that there are Tribal sensitivities to the use of all areas within the project site, and did receive Tribal input objecting to the use of several staging areas as pointed out in your comment. DTSC and DOI, however, have attempted to seek a balance in Tribal preference with the necessities of the cleanup project by hosting discussions and conducting site visits to identify suitable areas for the soil staging and storage areas. The agencies have also proposed to the Tribes during the TWG and site walk of October 19 and 20, 2014 to map and reduce the amount of areas to be used within each of those proposed staging locations prior to providing	The Federal agencies have received written comments and met with the Tribes on several occasions regarding the staging areas for the remedy. In the DTSC/DOI Direction letter of April 4, 2014, DOI provided direction to PG&E to eliminate Sites 15, 16 and 19 from further consideration based on Tribal input. It is unfortunate that areas 6, 7, 12 and 13 are located in areas of tribal cultural significance and values while being optimum locations for construction of the remedy and decommissioning of the IM-3 facility. The agencies, however, must also consider the information provide by PG&E	While worker and public safety are of paramount importance to the Tribe as well, the Tribe believes that, with proper planning and management, PG&E can safely operate with alternative storage and staging areas in deference to the Tribe's legitimate cultural issues at the proposed sites. Again, DTSC maintains that it must "... seek a balance in Tribal preference." The DTSC has decided to direct PG&E to consider whether it can perform construction and decommissioning without using those areas. It is no surprise therefore that PG&E concluded that the work could not possibly be done without using those areas, and that the benefits of using those areas "... would outweigh the benefits of eliminating [them]." It is not appropriate for PG&E to attempt to balance the effects and	This RTC was discussed at the July 23 TWG meeting.

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						property, may otherwise be overridden *only if expressly required by DTSC or the federal government*. Absent further agreement by the Tribe or an express order by DTSC or DOI to PG&E, the Tribe will allow only the implementation of "Alternative Approach Option 1."	remedial infrastructure in the Upland, is required for efficient, successful and safe implementation of construction activities and will be beneficial for a number of reasons set forth in RTCs #860 FMIT/TRC, #861 Hualapai/ TRC, #862 Cocopah/TRC, and #863 Chemehuevi/TRC . The FMIT comment refers to the 2006 Settlement Agreement between the Tribe and PG&E. As the FMIT note, PG&E agreed to "timely and meaningfully consult with the Tribe and . . . honor Tribal concerns to the maximum extent practicable." PG&E understands that the FMIT objects to the use of Areas 6, 7, 12 and 13 and has considered the information provided by the FMIT regarding staging and soil storage areas, as described above, and believes it has fulfilled its Settlement Agreement obligations. PG&E disagrees that it cannot use the FMIT's property for remedy-related uses absent an "express order" by DTSC or DOI. As noted by the FMIT, the easement gives PG&E the right to use the FMIT property for "conduct[ing] its legally-required Remediation." Approval of the design and the C/RAWP by DTSC or DOI would obligate PG&E to carry out the remedy as proposed therein and would be sufficient to show that use of the FMIT's property for staging and soil storage is necessary for PG&E to conduct its legally required remediation.	direction to PG&E on the supplemental 90% design. As a result of Tribal input, the agencies directed PG&E in our April 4, 2014 letter to eliminate the use of sites 15, 16 and 19. DTSC understands that BLM is working with the Tribes on a treatment plan related to the TCVA. Nevertheless, agencies have charged PG&E with the responsibility to evaluate if construction and decommissioning can be done without the use of areas 6, 7, 12 and 13. It is PG&E's belief that the uses of those areas are necessary.	regarding the health and safety of the public and workers, the environmental impacts from additional traffic and schedule in making our decisions. Therefore, areas 6, 7, 12 and 13 should remain as options for staging during construction; however PG&E should minimize their use to the extent practicable. See also RTC #26 FMIT-12.	benefits of its project components. The Tribe requests that an alternative(s) be studied in the SEIR that excludes these objectionable staging areas, just because it was disturbed by earlier Interim Measures (IM) doesn't mean the land has lost its cultural integrity. As has been relayed in many meeting venues, the Fort Mojave Tribe was not consulted with during the earlier IM 1, 2 and 3, project disturbances by BLM. Had it been consulted, this subject conversation wouldn't be happening. But because it didn't occur then, we are being asked to allow further cumulative adverse impacts to the TCP. The "after the fact" consultation/environmental analysis does not give PG&E, DTSC/DOI a ride for free card. Since all impacts cannot be eliminated, then reduction to the bare minimum should be the focus. Again, this is a situation between want and need. The tribe did not waive its right to comment on the remedy design and potential impacts of such and so offers these final thoughts on the project use, cumulative effect and future implementation of the final design. As to PG&E's interpretation of the easement, there is an express requirement that "Remediation," a term defined to mean "investigation and remediation activities on and at the Property," be "legally required." Thus, the	

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							PG&E also notes that under the 2006 Settlement Agreement, the FMIT agreed to not to "oppose PG&E's efforts that are subject to [the] Agreement to remediate the chromium plume at the Topock Compressor Station," and that both PG&E and the FMIT are obligated to cooperate with state and federal agencies "in ensuring that the selected Groundwater Remedy and Soils Remedy become operational and are certified as complete." (2006 PG&E/FMIT Settlement Agreement, VI.B.2.d; 2012 PG&E/FMIT Settlement Agreement § VI.C.)			activities themselves on the Property must be legally required, not that PG&E can engage in any activity that it wants or it feels it needs that is related to the overall remedial action required by DTSC and DOI.	
19	FMIT-5	Non-design	Other			The Tribe notes that PG&E has considered the alternative design concepts proposed by the TRC[7] for the utility crossing at Bat Cave Wash as presented with the December 23, 2014, directives from DOI/DTSC[8]. The location of this proposed crossing is on FMIT property at the location of the current Bat Cave Wash bridge crossing. PG&E has previously considered the need to extend its utilities across Bat Cave Wash at this location. In lieu of PG&E's earlier proposal to construct an aerial crossing, it is now proposing a design involving a raised structure over box culverts. This design will accommodate installation of piping and conduits above the wash channel. In addition to that design, PG&E provided an analysis in the Supplemental 90% of the alternative designs proposed by the TRC[9]. Characterizing the TRC designs as "ford crossings," PG&E rejected such designs based on essentially the following reasons: • This type of design allegedly had been rejected by both Agency direction and Tribal preference at the 30% design phase. • The design would drastically alter the road profile, thereby altering PG&E's design criteria. • Such a facility would be overtopped by a 25-year, 24-hour design storm, again violating PG&E's design criteria. In contrast to PG&E's position, the Tribe responds point-by-point as follows: • Design review as established for this project is a progressive process. As such, more details regarding the proposed design have unfolded at each review stage. Details regarding the nature of the current design proposal for this crossing were not presented at the 30% design. As stated earlier, it was instead an aerial crossing that was proposed. Not that the Tribe would have preferred such a structure, but it is not appropriate for PG&E to suggest that the Tribe would have preferred the current design without consideration of reasonable alternatives. Alternatives related to this design were not previously presented. • The Tribe recognizes that the alternative design would alter the road profile, though the term "drastically" has not been substantiated by PG&E. That is the point of creating a design that is compatible with the existing landscape and avoiding an obtrusive structure. Based on what	After further deliberation and consideration of all 90% comments received on this topic, PG&E changed the design of the northern BCW crossing to involve a) keeping the existing access road and b) burying the piping/ conduits within BCW and up-gradient of the existing access road. Similarly and concurrently, PG&E also changed the design of the southern BCW crossing to remove the aerial crossing and bury piping/conduit within BCW. The revised design was provided during the 90% RTC period and included in **Attachment C** of the final RTC table.	**Attachment C** illustrates that the new pipeline alignment "I" will travel through many AOCs and SWMUs (i.e., SWMU-1, SMWU-5, SWMU-9, Station Perimeter, Storm water Piping, AOC-1, extension of AOC-4, AOC-13, and AOC-21) including waste disposal/ discharge/ treatment areas in Bat Cave Wash and the lower yard. Therefore, enhanced opportunistic sampling pursuant to C/RAWP (Table 5.5-1) is required as well as general added caution due to the increased potential for		The Tribe appreciates PG&E's adoption of an alternative design at the Bat Cave Wash crossing and maintaining the natural setting in the design process.	

[7] Technical Memorandum from Topock Technical Review Committee prepared by Charlie Schlinger, "Design Alternatives – Bat Cave Wash Crossing – Topock Compressor Station Groundwater Remediation Project," November 12, 2014.

[8] Letter from Ms. Pamela Innis, DOI, and Mr. Aaron Yue, DTSC, to Ms. Yvonne Meeks, PG&E, re "Directives on Outstanding Issues on the Basis of Design Report ...," December 23, 2014.

[9] See Section 4.0, particularly Section 4.4, in the 90% Supplemental BOD.

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						was presented by the TRC in December of 2014, the vented ford design results in little / no change to the road crossing profile. The Tribe notes that at the February 19, 2015, TWG meeting, PG&E disclosed that there was not even the current crossing structure present at this location prior to 2004 and prior to the construction of the IM-3 treatment plant. The current crossing structure was installed by PG&E without consultation with the Tribes and without a CEQA document. We understand that previous access was unimproved access. • What is inviolable about deviating from the referenced design storm, other than it is inconsistent with PG&E's arbitrary design criterion (25-year return period, 24-hour duration storm)? During the February 19, 2015, TWG meeting it was also disclosed that the referenced PG&E design criteria were established *ad hoc*. Also, the referenced design criteria (Appendix C, 90% BOD Report) do not indicate a 24- hour duration storm, instead they related to a reference storm of duration equal to the time of concentration ("TOC") within the watershed. For the relatively small tributary watershed above this location, TOC would likely be considerably less than 24 hours. Considering that the project may extend well beyond a 25-year timeframe or that a storm of a magnitude greater than a 25- year average recurrence interval could occur during the operational period of the remedy, or even on two successive days in the operational period, the 25-year criterion does not afford full assurance that the road will not flood out. At the same meeting, PG&E pointed out that a ford would likely be overtopped every year. While this would likely involve increased maintenance on an as-needed basis, its advantage is in providing a less intrusive structure across the landscape. It may also be a cheaper alternative. Also at the meeting it was pointed out that continued use of a bridge structure over an extended period, might somehow constrain FMIT's future preferences regarding its eventual removal on its own property. Finally, improving accessibility in a manner that would invite more users onto its property, is not a preference for the Tribe. The landowner's preference should be provided great weight here as outlined above pursuant to settlement and easement terms. During the meeting, DTSC explained its position that, despite the Hualapai's December 3, 2014, letter[10] requesting consideration of various alternative crossing designs as presented by the TRC, that the joint DTSC/DOI letter of December 23, 2014,[11] directed PG&E to proceed with its own preferred design for the crossing, because the Agencies had not received (written) direction from FMIT, the property owner. This is a rather insulting position that the Agencies are presenting to FMIT. Recognizing that FMIT is indeed the property owner, and that the Hualapai Tribe deferred to FMIT on the decision after presenting some alternative designs, why would the Agencies not direct PG&E to consider presentations of the alternatives or even an open discussion of them at a TWG meeting? The agency letter maintains that it considered "... all input received to [that] date." Should we then conclude that the alternative designs prepared by the TRC and presented by Hualapai were considered and dismissed without notice to or consultation with the Tribes or FMIT, the landowner? FMIT did not directly respond in writing, expecting that some type of analysis would be included in the Supplemental 90%. Indeed it was, but only to the extent that any alternatives would be dismissed. The Tribes were also told that consideration of a buried utility crossing was rejected at the 30% design stage and, therefore, PG&E did not consider burying the utility trench at the crossing. This is also misleading considering that the earlier designs were considering burial of utilities along the axis of Bat Cave Wash, not at one location transverse to the wash, such as the location under discussion. As for the issue of site access, FMIT was told at the recent TWG meeting that the area is already accessible from the west by one other route. The FMIT position should be abundantly clear: Because of the reasons of the impacts, not only to the FMIT property, but also to the unique cultural resources downstream from the crossing, the Tribe vigorously objects to the design proposed in the Supplemental 90% design document. FMIT requests to discuss/consult on this further with the agencies, including considering an alternative involving keeping the existing crossing and burying the utility trench within the wash.		encountering contaminated media. Finally, detailed trench logs are requested for this pipeline segment as well as other segments passing through soil investigation areas. Appropriate sections of the document should be revised to incorporate the requested changes.			
20	FMIT-6	Non-design	Other			Figure 3.5-9A of the 90% BOD report depicts "Proposed Access Routes for Remedy Features – California." Considering the attendant impacts that would be projected from ongoing incursions for the purposes of monitoring and maintenance along these routes over the lengthy period of remedy	PG&E will be discussing this comment, and its response to this	DTSC will be communicating with FMIT directly		Please note that the Tribe is only asking for consideration and	The agencies will provide direction to PG&E, see response

[10] Letter from Ms. Loretta Jackson Kelly, Hualapai Tribe, to Mr. Aaron Yue, DTSC, and Ms. Pamela Innis, DOI, re "Addendum for Verification of Staging Areas and Arsenic Monitoring Well Locations," December 3, 2014.

[11] Ibid., Footnote 14.

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						performance, the Tribe proposes, to the extent practicable, consideration of a policy of *access by foot traffic only* ("ABFTO"), wherever and whenever possible. This would not only lessen the severity of the impacts to the sacred areas, but might also establish a spirit of respect, if not reverence, for the landscape. Again, the Tribe requests to discuss the logistics of this proposal with the agencies and PG&E prior to final design.	comment, directly with counsel for DTSC and counsel for the Fort Mojave Indian Tribe.	regarding this matter.		further discussion as to the practicability of applying ABFTO to avoid impacts to certain sensitive areas in accordance with the PA, CHPMP, CIMP and Access agreements which recommend "Avoidance" as the first step. Relative to PG&E's comment, a brief discussion between counsel occurred in which positions were restated but no agreement reached. The Tribe therefore requests further discussion of this matter.	to comment 69.
21	FMIT-7	Non-design	Other			Considering the status of the remedy design, the Tribe's technical consultants spent considerable time reviewing the technical specifications and drawings as presented in the 90% BOD document. Particular consideration was given to whether the designs provide for optimal configurations to achieve the Tribe's preferences for minimizing the impacts of the design. In doing so, our reviewers noted several instances where the drawings were inconsistent with the written specifications. While the written specifications allow for a range in the minimum spacing between pipelines, the application to the drawings appear inconsistent. While this may seem simply a matter of fixing one or the other, this problem confounded the Tribe's technical review. An example is that the pipe spacing between similar water line sizes was inconsistent on Sheet C-07-102, where in Section H1 the space between water lines ranged from 8 to 10 inches, but in Section A10, the spacing ranged from 4 to 6 inches. The Tribe's preference is the minimum feasible separation that results in the narrowest trench and a minimum of disturbance. The Tribe offers the assistance of our technical personnel to assist in achieving this goal, if requested by the Agencies and/or PG&E. Design drawings and specifications become part of the bid package for contractors performing the work and eventually their field guidance. If the information provided to contractors is inexact or inconsistent, there is a high risk that the contractors may opt for a design or location that is not optimal, while still potentially conforming to the contract. This example further underscores the importance of impact minimization at the design stage and the presence of Tribal Monitors. This also supports the Tribe's comments requesting for a clear framework for Tribal participation in the construction and implementation of the groundwater remedy moving forward.	Pipe and conduit spacing and configurations within trenches will be reviewed for consistency and revised as needed during the final design. This goal of this effort will be for consistency in final documentation and to minimize the disturbance impact of the trenches.			This item was discussed with PG&E engineering staff during a recent TWG meeting. FMIT is satisfied that PG&E has committed to reconciling conflicting information between design narratives and drawings.	This RTC was discussed at the July 23 TWG meeting.
22	FMIT-8	Non-design	Other			During the approval of the Groundwater FEIR and then subsequently throughout the reviews and discussion of the groundwater remedy design, the Tribe was told that the cap on the number of boreholes is 170. Likewise, the Tribe has repeatedly emphasized that each such intrusions desecrates the landscape individually and cumulatively. Now, Tables ES-2A and ES-2B provide "estimated" borehole counts and construction information, respectively. Examination of Table ES-2A indicates that the borehole count could very well exceed the 170 well count. This is confirmed in Line 41 of the table, where PG&E makes an allowance for up to 20 additional boreholes for monitor wells that may be needed at "unidentified locations." Figure ES-4A illustrates the entire layout of infrastructure incorporating the proposed monitor and remediation wells as well as the existing wells that will be incorporated into the design. Needless to say, simple examination of this figure reveals a disturbing level of impact to the landscape. PG&E has said that it expects the utility of some wells to be ineffective during the project lifetime. And accordingly, PG&E plans to "replace" wells at the "same locations" if they remain essential to remedy performance. However, these "replacement wells" will not be the same borehole, but will be in a *new* borehole near – but not in – the already counted borehole thereby making a farce of	Regarding well replacement, Section 4.2.2.5 of the O&M Manual Volume 1 states	As stated in the 60% RTC to DTSC-101, "DTSC based the number of wells on estimates provided by PG&E at a stage when the remedy was quite conceptual. While every effort should be made to minimize the total number of wells, if necessary, wells should be installed for an identified	DOI defers to DTSC regarding the well count found in the FEIR. In response to your concerns stated in the last paragraph, it is true that the project is a technically driven project that must ultimately result in cleanup remedies implemented to protect human	The Tribe fully understands and appreciates the realities of wear-and-tear of material components over time. The comment is intended to highlight the Tribe's continuing concern over these intrusions into sacred grounds and the potential spiritual implications of the infrastructure. 170 is a significant number, but	This RTC was discussed at the July 23 TWG meeting.

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						the alleged 170 well count. Again, this creative math represents further intrusions into the landscape, one that has not been the subject of the required environmental analysis. Finally, it is evident that the soils investigation will superimpose another level of intrusions including both borings and trenches upon what has already been projected for the groundwater program increasing further the direct and cumulative impacts to the area. It seems that the project is being dominated by a technical mindset, one in which the overarching view is to collect whatever information may be desired, largely regardless of the impact to the cultural and environmental resources. Despite claims to the contrary, and the occasional compromise or impact reduction, there appears to be no real effort to constrain the level of site disturbance, and again, no one at the decision making level has the professional qualifications and experience to consider a proper and reasonable balance between the competing interests. DTSC and BLM have recently brought on archaeologists to the project, which should have allowed a qualified experienced new set of eyes and viewpoint to understand the concerns raised by the Tribes. However, the views of those experts seem to be focused mainly on the archaeological aspects and not the tribal cultural values. Those archaeologists have not been able to consider the full picture of the remedy design impacts, because they have been limited by their specific tasks, time dictated in their respective contract/ employment or lack of qualifications beyond archaeology. This is an issue the Tribes have raised face-to-face in meetings, such as the recent consultation meeting with DOI on January 23, 2015.	"Wells that cannot be restored to a condition that is satisfactory to fulfill the given well objective using routine or non-routine maintenance methods…. may require replacement. Well replacement entails the construction of a new well within a new borehole, and should be considered as the least desirable option to achieve the given objective of a well. The location of replacement wells will be determined based on the evaluation of available remediation system performance data (e.g., current hydraulic gradient and water quality data, as well as model predictions), accessibility, and agency-approved work plans and compliance documents. If it is determined after further evaluation and discussions with agencies that a replacement well is warranted and that the most suitable location to achieve the well objective is within the area of the original well location, well replacement will proceed under the scope of this O&M Plan..." In addition, the FEIR addresses this same well replacement concept and the associated well count, with the following language: "One option would be for existing wells to be abandoned and replaced with an entire new well. The new well would be located close to the existing well, within the areas currently designated in the FEIR (see Exhibit 3-4 above).	purpose and not be artificially bound by the specific well counts for the design." Please recall that DTSC has been explicit during the CTF, CWG and TWG meetings that the well count from the certified EIR was based on PG&E's estimate prior to completion of the East Ravine and Topock Compressor Station sampling. DTSC will evaluate impacts of additional wells in the subsequent EIR. DTSC express grave concerns regarding the Tribes' statement that the project is "…dominated by a technical mindset, one in which the **overarching view is to collect whatever information may be desired, largely regardless of the impact to the cultural and environmental resources"** (emphasis added). DTSC acknowledges that the project is located in a culturally significant area; however, DTSC is mandated to protect human health and the environment. In the process we try to protect the biological and cultural resources to the extent possible; however, infrastructures are needed to achieve the necessary cleanup. Impacts are unavoidable. Agencies and PG&E	health and the environment. It is unfortunate that the project occurs in a location that of such significant cultural and spiritual importance to the Tribes. There will be cultural and biological impacts resulting from the groundwater remedy and the efforts by DOI, BLM, DTSC, and PG&E to minimize/ mitigate those impacts should not go unrecognized (see the following documents: CIMP, PA, CHPMP, MMRP from the 2011 Groundwater Remediation EIR). DOI and BLM believe we have a very qualified and knowledgeable archeologist and an experienced tribal liaison dedicated to this project. Both of these people have worked with Tribes on similar projects for many years. As noted in our May 1, 2015 letter to the FMIT, the BLM Arizona Deputy Preservation Officer also has advisory role. Accordingly, we believe the BLM has the appropriate federal cultural resource preservation expertise to fulfill its responsibilities.	even a lesser number is a concern. Further, the Tribe's comment represents an appeal to extend every consideration towards not increasing the number of wells beyond the prescribed number in the FEIR.	

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							Unless the new well encountered different geologic conditions and/or has significantly smaller capacity than the well it replaced, there would be no net change in the total number of existing wells. If the new well has significantly smaller capacity, it might be necessary to replace an existing well with two new wells under certain conditions" (see FEIR, pages 3-26 and 3-27). Replacement wells put in the same location as original wells would not be counted as additions to the estimated number of wells disclosed in the EIR. See also 60% RTC #606 FMIT-169 for references to the evaluation of environmental impacts of well replacement in the FEIR.	have been very mindful of Tribal concerns with remedy and monitoring wells and have held several meetings and conducted several field visits (including multiple trips for the same proposed well) to evaluate the proposed well location(s) and consider alternative locations more acceptable to Tribes. This has included trips and/or discussions regarding, at a minimum, the following wells: FW-1, FW-2, MW-S, MW-HH, MW-II, MW-10D, MW-11D, MW-V, IRL-4, MW-DD, MW-EE, IRL-3, IRL-2, MW-BB, MW-I, MW-P, MW-AA, IRL-1, MW-CC, MW-Z, location of IRZ wells along the road, location of River Bank extraction wells and provisional wells, and East Ravine extraction wells, and wells MW-X and MW-Y. These efforts have been conducted to attempt to minimize impacts to cultural and environmental resources identified by Tribes as well as to notify Tribes of the need for particular wells. DTSC would like to point out that even during the April 2015 TWG meeting, it was pointed out to the Tribes that the agencies would have installed many			

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								more sentry wells to ensure the safe and effective operation of the remedy, but it is due to the understanding of the Tribal concerns that the agencies are self-limiting the proposed sentry wells to two in Arizona.			
23	FMIT-9	Non-design	Other			As has been said many times by the Tribe over the years, because to Tribal people there is a sanctity associated with this landscape, and because the Tribe holds religious and spiritual connection and ceremony to the Topock area, noise control and abatement is essential. It is equally important to recognize that adverse impacts arise both from audible and inaudible energy. Vibrations, high and low frequency waves, etc. are all impactful to the spiritual setting of the landscape, regardless of the presence of Tribal members. As you are aware, the ambient noise levels across the landscape arise from a number of sources including the Interstate highway, railroad, compressor station operations, and nearby recreational areas and enterprises. The construction activities and eventual operational activities associated with the remedy will add incrementally and cumulatively to these existing sources. Treatment of noise levels is addressed in PG&E's Cultural Impact Mitigation Program ("CIMP") in CUL-1a-8h. In the 90% BOD document, compliance with noise standards is addressed in Appendix C, Section C.11. This section cites San Bernardino County Code, Division 3, Chapter 83.01.080, which exempts "temporary construction, maintenance, repair, or demolition activities between 7:00 AM and 7:00 PM, except on Sundays and federal holidays." Clearly this part of the code is potentially less stringent than the protocols and practices established in the CIMP. Again, the Tribe expects that PG&E will work earnestly to achieve practices that go beyond the minimum civil standards. Appendix C addresses design standards in general and should not be limited to codes. Reference to that County Code must be struck throughout the 90% BOD document as inconsistent with governing project requirements. Moreover, the project documents must commit to resolving Tribal noise concerns that might arise during project construction and implementation – beyond simply referencing the existence of a Noise Coordinator.	San Bernardino County Development Code, as well as the Mohave County Zoning Ordinance, noise and vibration standards are applicable legal requirements that PG&E cannot ignore. Because these standards were part of the EIR analysis and incorporated directly into Mitigation Measures NOISE-1 and NOISE-2, as well as indirectly into Mitigation Measure NOISE-3, PG&E also cannot delete references to the County code (in whole or in part) in the project documents. According to the Tribe, it is "important to recognize that adverse impacts arise both from audible and inaudible energy." PG&E agrees with the EIR, which recognize that even with mitigation, the "values associated with the Topock Cultural Area cannot be reconciled with additional project-related noise," and thus concludes the project will have a significant an unavoidable impact. (EIR, Vol. 2, at p. 4.9-24; see also EIR, Vol. 1 at p. 4-118 [responding to FMIT's concern that tribal values were not addressed in the EIR]; id. at p. 4-127 [responding to FMIT's request not to rely on the County's		DOI believes the CIMP noise protocol and the EIR noise mitigation measures adequately address the FMIT concern.	By continuing to cite conflicting noise standards, the intent of the Basis of Design report remains ambiguous and open to interpretation and possible future disagreement. The Tribe requests the addition of language to the effect that, when and where there is a conflict among the various noise standards, the most stringent (most noise restrictive) shall apply. Further, the Tribe notes that in addition to current standards, CEQA allows for the provision of project-specific standards. See CEQA Guidelines section 15064(d). The Tribe requests that such standards for outdoor worship be developed and considered in the SEIR.	DTSC Response: Comment noted. Noise impact evaluations are based on established regulatory thresholds. Noise impact is a resource area that DTSC will consider in the upcoming SEIR.

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							noise standards]). This analysis included consideration of ambient noise and vibration. (EIR, Vol. 1 at p. 4-123.) PG&E commits to constructing the remedy in a manner that is safe, compliant with the law, respectful as possible given the fact that unavoidable impacts exist, and expedient, and has committed to numerous steps, above and beyond those required by the San Bernardino County Code to address the Tribes' concerns. As the Tribe notes, the EIR requires compliance with Mitigation Measure NOISE-3 and the CIMP protocols for noise (CUL-1a-8h) to minimize noise impacts on the Topock Cultural Area to the extent feasible. The EIR also analyzed the cumulative impacts of adding the project's noise to the existing noise in the environment. (EIR at p. 6-38.) That analysis acknowledges that the project "would generate noise that could expose the Topock Cultural Area (a place of worship for Native Americans) to levels that . . . would conflict with Native American values associated with this resource" and notes that those impacts are significant and unavoidable. (EIR, Vol. 2, at p. 6-38.) . Regarding commitment to resolving Tribal concerns, PG&E has proposed protocols in addition to designating a Noise Disturbance Coordinator. Section 2.8.4 of the CIMP CUL-1a-8h (Noise Protocols)				

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							states "[s]hould a concern about the actual noise generated by remedy construction arise, PG&E disturbance coordinator will thoroughly investigate and resolve the issue. A qualified acoustical consultant (Institute of Noise Control Engineering [INCE] Board Certified or Professional Engineer in Acoustics) will evaluate all reoccurring disturbances for compliance with applicable standards. All noise complaints and resolutions will be recorded, tracked, and reported to DTSC in the quarterly compliance reports." Further, Section 2.8.5 of CIMP includes the following specific communication protocols with nearby noise-sensitive receptors and the Tribes: • A detailed project schedule is established and published for all stakeholders. • Monthly notification to Agencies and the Tribes of scheduled field activities. During periods of extensive construction activity, these notifications will be issued more frequently – weekly and/or daily, as appropriate. • After issuing these notifications, notify the nearby noise-sensitive receptors and Tribes of any schedule changes. • Provide an open-				

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							communication process for Tribal representatives to seek more information about Project noise-generating activities. PG&E welcomes Tribal input on timing of Project noise-generating activities and on potential noise-reducing methods. • The contact information for the disturbance coordinator will be posted in a conspicuous location near the construction areas. This information will also be mailed to all nearby noise-sensitive receptors and Interested Tribes. • In addition to the communication methods described above, PG&E will consider posting construction schedule information at the information kiosk (CUL-1a-3c). PG&E also will consider and may decide to use additional communication processes. The CIMP noise protocol and the EIR noise mitigation measures go beyond the County's noise requirements, but do not conflict with the County's noise standards, which also are applicable to the project. Accordingly, no revision to Appendix C, Section C.11, which mentions both the EIR noise mitigation measures as well as the County noise standards on which the EIR relied,				

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							is required.				
24	FMIT-10	Non-design	Other			The Tribe is concerned that there are a number of developments that have occurred and are planned within the Park Moabi Area, which comprises parcels of land leased by private developments from the U.S. Bureau of Land Management ("BLM"). To date, there has been considerably greater development within the present Park Moabi lease area than originally envisioned by the Tribe. Presently, the C/RAWP proposes an option for the "Use of Staging Areas at Moabi Regional Park."[12] This option is offered by PG&E as an alternative to using staging areas 6, 7, 12 and 13 on the FMIT property, sites which the Tribe has indicated are unacceptable due to cultural impacts. PG&E points out that these areas "... were not originally intended for temporary facilities or as a support zone for construction in the Upland because they were not adjacent or central to the primary work zone in the Upland." It had previously been suggested by PG&E that these areas could serve as construction headquarters and a main temporary equipment and materials laydown area. The memo now indicates that use of these areas for the added purposes of replacing the aforementioned proposed staging areas might result in their expansion to accommodate the added purposes. The memo concludes that in PG&E's view this option, along with the other alternatives evaluated, "... would outweigh the benefits of eliminating those areas [on FMIT property]." It is unacceptable that PG&E would be making such decisions that adversely impact cultural resources identified by the Tribe, particularly in light of PG&E's limited rights on FMIT property. It seems as though PG&E is asking to have *both* an expanded Park Moabi present and the staging areas that are unacceptable to the Tribe. This is unacceptable to the Tribe and is why consultation is necessitated. Similarly, the Tribe must be involved in the terms for any lease amendments prior to lease finalization. Moreover, if such areas were dedicated to such uses, regardless of whether they are slated for the original purposes or expanded to accommodate the additional uses as described above, are there provisions within the property lease(s) that would control future developments? The Tribe is concerned with the precedent established by the original situation involving seemingly continual expansion of the lease associated with the regional park. The limits of the added infrastructure associated with the remedy must be explicit within the terms of the lease and guard against mission creep. Moreover, at the present time, it appears that the proposed developments in the Park Moabi area do not adequately address the treatment of the nearby cultural resources or the open-ended nature of the potential and alternate sewer, fire water, and water connections. When would these environmental effects be considered if not now? How would their potentially significant environmental impacts, including cumulative impacts, be considered? Some of these areas are outside the Area of Potential Effects and project boundaries. When will these aspects be handled pursuant to the Programmatic Agreement? These seem to be critical path items requiring Tribal participation.	Please see RTCs #860 FMIT/TRC, #861 Hualapai/ TRC, #862 Cocopah/TRC, and #863 Chemehuevi/TRC, for response to the proposed use of Areas 6, 7, 12, and 13. PG&E defers to DOI/BLM for response on Tribal consultation and Park Moabi lease(s). PG&E defers to DTSC for response on environmental review and the project boundary, and to DOI for response on APE and PA.	DTSC is conducting a subsequent EIR (SEIR) to evaluate whether the additional remedy design features that were not considered or were changed since the conceptual design used for the 2011 certified FEIR may have new significant impacts from those disclosed in the 2011 certified FEIR or increase the severity of the impacts disclosed in that document. This upcoming SEIR analysis will consider the use of Park Moabi for the remedy and determine whether use of that area will have new significant impacts	DOI and BLM appreciate the concerns of the Fort Mojave regarding the ongoing development of the Park Moabi area. The lease agreement with San Bernardino County and the associated use by the concessionaire are not part of this project and will not be address as part of the design review. The FMIT may contact BLM directly regarding the Park Moabi lease. A cultural resources inventory of the operations and staging areas was conducted in January of 2015. Tribes were present during the archaeological fieldwork. BLM is evaluating the information provided in the survey report and will work with the Tribes regarding potential impacts to cultural resources. The Area of Potential Effect changes have been discussed between the agencies and the tribes at several recent technical and cultural meetings. Consultation with the Tribes and SHPO will occur once the	The Tribe appreciates DOI's invitation to contact BLM to discuss issues related to the types of development permissible on its lessee's parcel. The Tribe looks forward to further discussion and consultation regarding both the potential impacts to cultural resources which is required by the PA and other documents and the amendment of APE boundaries. The Tribe reiterates its request for the agencies to allow meaningful discussion of these important issues and not leave them to the very end of the project process.	This RTC was discussed at the July 23 TWG meeting. RTCs related soil storage and construction staging areas were also discussed at the July 23, August 19, and August 26 TWG meetings.

[12] See C/RAWP Appendix W, "Technical Memorandum: Proposed Use of Certain Areas for Construction, Staging, and Soil Storage at PG&E Topock Compressor Station," Option 2, p. 7.

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								beyond those disclosed in the 2011 certified FEIR.	boundaries of the amended APE are determined.		
25	FMIT-11	Non-design	Other			The Tribe recognizes that the PG&E Project organization listed in various organizational charts throughout the documents are living documents. However, because of the potential for conflicts in communications to arise in the field during construction and remedy implementation, clarification of reporting contacts for Tribal Monitors is essential. Clear lines of communication and lines of authority are critical for successful implementation of Tribal Monitoring. For example, the CHPMP and the C/RAWP document outline that Tribal Monitors provide "Daily Reports" to the designated "Site Supervisor" and /or "PG&E's On-Site Project Manager" (or designee). The C/RAWP organization chart and related document text uses different terminology that indicate that the "Site Operations Manager" will be responsible for contacts with site visitors and observers. The "On-Site Project Manager" must be identified, if Tribal Monitors need to coordinate with this individual. Additionally, the Tribal Monitors need to be able to communicate with the person having authority to stop construction or otherwise modify the field activities as appropriate if such actions are warranted in order for cultural resource protection purposes.	Comment noted. The project organization language in the final C/RAWP will be made consistent. The "On-Site Project Manager" and "Site Operations Manager" refer to the same position. The final C/RAWP will use the term Site Operations Manager exclusively. Tribal monitors will be able to communicate directly with the Site Operations Manager or his designee, as described in the C/RAWP. Tribal monitors will also be able to communicate directly with the Construction Manager. The Construction Manager, Site Operations Manager or their designee will have authority to stop construction. Any modification to field activities would only be implemented after a complete compliance review.			This is an important provision that will assure proper and efficient communications through the construction and operations phases of the project. If a "complete compliance review" is necessitated, the Tribe must be a participant in the process. Please keep in mind that, due to the complexity of the project work schedules, the Tribal monitoring duties will necessarily be shared among the participating Tribes. The Tribes have established an intertribal communication network for information exchange. Accordingly, the compliance review must allow time for this intertribal communication to take place.	Comment noted.
26	FMIT-12	Non-design	Other			FMIT has been working with BLM and the other Topock participating Tribes for the past two years on the previously mentioned Tribal Cultural Values Assessment (TCVA) document that was provided to BLM in September 2013, and an amended version of the TCVA was subsequently submitted on February 18, 2014. On April 2, 2014, BLM directed PGE "to go forth with a field inspection of the findings" in the TCVA. That letter summarized certain discussion during a conference call held on December 2, 2013, between BLM, PG&E and the cultural resource management firm hired by PG&E, Applied Earthworks (AE). As stated in the April letter, during the December 2nd conference call, as a "preliminary, interim measure," BLM had instructed PG&E: • To create a methodology for conducting a field check of the findings identified in the CVA; to develop protocols/guidance on what will be • Recorded/confirmed as an archaeological manifestation; to develop criteria for distinguishing sites from isolates; and to identify the • Archaeological manifestation of the Topock Maze. The April 2nd letter also directed AE, based on the "discussion items" in the passage quoted above, to develop a "study plan" to be used "to guide the field effort to evaluate the archaeological potential of the findings identified in the CVA." The Tribes received written notification of this direction from BLM to PG&E and AE by letters dated April 9, 2014. Subsequently, the Tribes were provided, with a "Study Plan" dated April 25, 2014 prepared by AE. At a CHPMP meeting held on June 4, 2014, the Tribe informed BLM, PG&E and others, that the draft "Study Plan" dated April 25, 2014, is not acceptable given that it misses the point of the TCVA. The sites that the Tribe had identified in the TCVA are important to the Tribes for their cultural value. The strictly archaeological methodology proposed by AE in its Study Plan would yield a fragmented perspective that would fail to consider the range of cultural values associated with the Topock landscape.			In April 2015, BLM provided a new proposal to the Tribes concerning the process for recordation of tangibles and intangibles associated with the Traditional Cultural Property in the area prescribed in the TCVA. The purpose of the Draft Proposal for Documentation of Tribal Cultural Values in response to the TCVA was to acknowledge special values to tribes over and above the traditional archaeological	On August 4, 2015, the Topock Tribal Work Group presented to the BLM, DOI, and PG&E; a Counter Proposal to the BLM's April 2, 2015, draft proposal during the CHPMP meeting. Within this document, the importance of protecting the intangible cultural heritage related to the Topock area was identified and explained. During the August 4 presentation; the BLM, DOI and PG&E all expressed a need to review the document, which the Tribes agreed was appropriate. The Counter Proposal document strategy basically followed	BLM received the Tribes alternative TCVA proposal at the August 4 CHPMP meeting. BLM provided a final response on October 6, 2015

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						The Tribes offered to develop an alternative methodology for following up on the TCVA and provided a letter and document captioned "Recommended Approach for Inspecting Cultural Locations Identified in the Tribal Cultural Values Assessment" in August 2014. Although the Tribes have meet with BLM/DOI/ PGE and others during the course of two years, we still have not had a response to the Tribal documents referenced above. Until we have an official response, we cannot move forward or provide our comments or opinions on prioritizing which sites are to be addressed first. We need to have BLM's decisions on the numerous items we have discussed during the CHPMP meetings. This issue is of grave concern to the Tribes and since it related to implementation of the MMRP for the Groundwater FEIR, it is there to address the cultural impacts of the remedy implementation and its affects/effects to the TCP and the participating tribes. BLM's response is time critical: The final design and construction of such remedy is imminent, and the Tribes are once again a missing link. The Tribe's input into the process does not get added until it is too late and critical decisions will have be made by the Agencies without addressing the tribal cultural values and cultural resources that exist within the remedial footprint where the final remedy design will be implemented. We are at a critical time in the design stage of the Topock Project, and the decisions of BLM/DOI regarding this TCVA document are pivotal to the ability of the project to proceed. It behooves the Agencies to respond and address this tribal concern now, not later or down the road. The FMIT requests (1) an official response to the TCVA submitted November 21, 2013, and as amended February 18, 2014; (2) consideration of the Tribal alternative methodology that was recommended by the Tribes as part of the BOD; and (3) whatever CEQA measures would be applied to address this impact prior to project finalization.			manifestation s on the landscape. BLM anticipates meeting with the Tribes in the near future.	BLM's April 2, 2015, Draft Proposal, except that the Tribes would conduct the study and control the indigenous or Tribal Intellectual Property which resulted. From further discussions immediately after the presentation, the Tribes identified that there would be no impacts to the upcoming soils investigation work plan implementation schedule. At present, no response has been received from the agencies related to this Counter Proposal. BLM, did indicate via email from Renee Kolvet, that more time was required for BLM to respond, most likely in October 2015. To facilitate and not delay the implementation and schedule of either the Groundwater FEIR and SEIR documents, the tribes have begun the implementation of the Counter Proposal on FMIT lands in a good faith effort to ensure progress is being accomplished.	
27	FMIT-13	Non-design	Other			The Tribe holds firm to its holistic belief that the land and water as well as all other earthly components are connected. For reasons of schedule, the implementation of soil and water remedy components of this project had been implemented on independent timelines by the Agencies. Regardless of the reasons for such logistics, technical rationale dictates consideration of the interrelationship between these two programs. For example, the Tribe is aware that there may be important information to the conceptual groundwater model that might arise from sampling the pore waters in the Colorado River at the mouth of the East Ravine. Yet this sampling and the resulting information will not be available until the next phase of implementation of the soils remedial investigation. While it is obviously too late to change the remedy bifurcation, the Tribe would like assurance that soil information has been thoroughly considered and integrated as appropriate within the groundwater remedy design.	Much effort was put into integrating the soil information into the remedy design and coordinating with the Soil RFI/RI program to minimize duplication and disturbance. This integration is evident throughout the BOD, the O&M Manual, and the C/RAWP. Examples include: • Section 2.4.3 (Soil Contamination Areas) of the 90% BOD discusses the status of the soil investigation effort and the coordination between the soil			The Tribe appreciates PG&E's effort to date to integrate soil information into the groundwater remedy design. Moreover, the Tribe understands that information from the soil remedial investigation will be generated during the groundwater remedy implementation schedule. Of course, should such data collection provide information applicable to any aspect of the remedy design, it may be necessary to adjust as appropriate to that information. In such instances, the Tribe	This RTC was discussed at the August 19 TWG meeting.

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							investigation and groundwater remedy implementation. Section 2.4.3.1 states that "As soil data become available they will be used to guide and inform groundwater remedy design and construction in the vicinity of the soil investigation areas. Where appropriate—considering timing, efficiency and protectiveness—construction of groundwater remedy facilities will be coordinated with soil investigation and remediation activities." • Section C.2 of Appendix C (Design Criteria) discusses collection of additional geotechnical samples to support remedy design in coordination with the soil investigation program. As a result of this coordination, no new boreholes were proposed at the 90% design stage just for geotechnical data collection, thereby minimizing disturbance. • Section 7 (Soil Confirmation Sampling and Coordination with Soil RFI/RI) of the IM3 Decommissioning Work Plan incorporates existing soil data in			should be advised and brought in to participate in discussions related to whatever decision is at hand.	

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							the planning for confirmation sampling to minimize duplication and disturbance. • The Soil Management Plan (Volume 4 of the O&M Manual) establishes procedures and protocols to ensure that the management and disposal of potentially contaminated soil derived from the soil investigation areas that are generated during groundwater remedy implementation is handled in a manner that is protective of human health (including construction workers) and the environment within the framework of appropriate federal, state, and local requirements, and consistent with United States Environmental Protection Agency (USEPA) guidance. Regarding implementation of site cleanup activities, PG&E commits to carry out the work as expedient as possible. To that end, PG&E submitted additional details on the construction and start-up sequence in anticipation of construction activity in 2016, during the 90% RTC period and included in **Attachment D** of the final RTC table. This sequencing plan				

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							provides for start-up of system elements while construction proceeds. This approach will provide more time for data analysis and design refinement while still completing the overall program within the originally planned schedule. See also RTCs #72-75.				
28	FMIT-14					At the recent meeting of the CWG, a high-level schedule was presented, titled "Groundwater Remedy Design, Construction, and Initial Start-Up Schedule." The schedule addressed the general activities such as design, construction, CEQA Review, etc. One particular timeline on the schedule that caught the Tribe's attention is labeled "Ongoing Consultative Work Group/Tribal Communication and Tribal Consultation." This timeline is shown in brown and is a continuous line throughout the project duration. While the Tribe appreciates recognition of the need for ongoing communication and consultation, there are certain milestones in the process that in particular necessitate formal consultation. The Tribe notes that the schedule marks certain decision points where design, work plan, and CEQA approvals occur, there likewise should be definite milestones marking the timing of input from Tribes that would be used in making such determinations. Moreover, the Tribes are entitled to consultation at the Government-to-Government level pursuant to Section 106 of the National Historic Preservation Act ("NHPA"). As such, the Tribes should not be lumped with the CWG. The Tribe also strongly believes that a timeframe and performance criteria for the decommissioning of the Groundwater Remedy should be developed now. The Tribe is concerned if these items are put off into the distant future, that the concerns of the Tribe and its elders may be ignored and forgotten—"out of sight and out of mind" and left to someone's future interpretation who has no idea of the importance and seriousness of Tribal affiliation to this sacred place to the Mojave peoples. Consultation should begin immediately on developing those criteria.	The completion criteria/ performance standards for the remedy are presented in the BOD (Sections ES-2 and 1.2.1) and the O&M Manual (Section L.4). The current projection of remedial timeframe is also presented in the BOD. Once the completion criteria/ performance standards are met to the satisfaction of the agencies, PG&E will submit a plan to decommission the remedy in accordance with the CD and CACA. As stated in RTC #12 DTSC-8, PG&E will add a dedicated section on decommissioning in the executive summary of the BOD. It is important to note that at this time in the design process and before the remedy is constructed, steps to decommission any remedy components, that will occur decades into the future, will have to be general and conceptual. Descriptions of the conceptual decommissioning steps	DTSC anticipates that Tribal involvement beyond the 90% design will continue. DTSC believes that the current forum to gather input (CTF, CWG, TWG and specially arranged Tribal meetings) affords Tribes with many opportunities to consult with DTSC. DTSC does not envision the cancellation of the aforementioned meetings. Moreover, DTSC has offered, and did meet with Tribes on specific issues or concerns as requested. Furthermore, there are adopted mitigation measures in the certified 2011 EIR that provides additional opportunities for the Tribes to voice their concerns during remedy construction and operation outside of the meetings stated above. Please also note DTSC comment 8 requested PG&E to provide commitment to decommission all remedial	The Tribes have been afforded multiple opportunities for National Historic Preservation Act consultation pursuant to the Programmatic Agreement's Consultation Protocol throughout the design process. DOI and BLM will continue to consult with the Tribes through the comment resolution process should specific topics necessitate this (e.g., reinitiating consultation pursuant to the PA's Consultation Protocol on the Arizona wells) or should a Tribe request consultation on specific issues. We also will be working with the Tribes and Signatories and Invited Signatories in revising the CHPMP in the future. The timeframe for decommission the remedy is based on achievement of the remedial action objective and cannot be determined at this time.	As a landowner within the project area, FMIT must be apprised of any and all changes to the remedy that occur in its land, particularly those that have the potential for impacts. We reiterate our concerns regarding a decommissioning plan being done sooner than later after the remedial years have been completed. Developing even a conceptual plan now that documents Tribal priorities, goals and performance standards - followed up at a later time by a more detailed plan - would be more consistent with CEQA requirements and superior to a wholly deferred plan. See also RTC 15 FMIT-1. PG&E states its understanding that that there will not be a comment/review process for the final design. The Tribe remains concerned that the final design be considered in some transparent way, such as at least in the SEIR analysis.	A dedicated section (see **Attachment A** of the final RTC Table) that describes the decommissioning process envisioned for the proposed remedy will be added to the Executive Summary of the Final BOD. DTSC response to highlighted section: The final design will be made available to all stakeholders and Tribes once completed by PG&E. DTSC will also provide the draft SEIR for review during the 45-day comment period.

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						Additionally, the Tribe is aware that design review is a progressive process, and that this current review represents review at the *pre-final* stage of design. So it is likely that further design modifications will be made between now and the final ("100%") design and subsequent agency approval later this year. So in order to truly assess the project's significant impacts, there will be a need for Tribal participation beyond this 90% review stage. The "high-level" schedule indicates tribal consultation terminates with the submittal of comments on the 90%. After this time, the schedule refers to a period of "Comment Resolution" extending through (approximately) mid-June 2015, with the 100% to be completed by (approximately) mid-July 2015. CEQA review of design is estimated to be completed in early August 2015. Tribal input/review during each of these timeframes is essential and needs to be specifically identified in the schedule for that input to be truly timely and meaningful. In short, moving forward, there is a need for continuing and substantive Tribal input during final design, construction, and implementation of the groundwater remedy. The documents do not necessarily reflect that need.	provided in the 60% RTC #6 (Attachment T of Appendix I) reflects this fact. Any additional details should be considered speculative best guesses, and are subject to change at the time of remedy decommissioning. In general, high level schedules presented at CWG meetings are based on best available info at the time and are subject to change. Changes to the schedule are announced by the agencies. The latest version of the project schedule is posted on the DTSC website www.dtsc-topock.com. As for design modification between now and the final design, PG&E will present all anticipated design modifications for agencies, Tribes, and stakeholder review and comment during the 90% comment resolution period. Design modifications that are accepted by the agencies will be incorporated into the final design. As noted in RTC #7 DTSC-3 and RTCs #56-59, PG&E understands that there will not be a comment/ review process for the final design.	infrastructures at the end of the remedy.	DOI and BLM anticipate continued tribal communication throughout remedy construction as well and look forward to working with Tribal monitors and representatives to ensure that resources are protected.		
29	FMIT-15	Non-design	Other			As mentioned above, there were a number of items that the Tribe had commented in regard to the 60% BOD report, but resolution was deferred to the 90% BOD report. Our review noted that there were such items that were not properly addressed or for which the final comment resolution has been considered "resolved." In the former instance, it is explained that the 90% BOD document does not require revision.[13] For many dispositions of the Tribe's comments, the characterization of the resolution is questioned by the Tribe: (1) Who made the determination that the item is "resolved"? (2) In instances where the Tribe indicated that resolution at the 60% stage was "... pending review of 90% design," it is appropriate to consult with the Tribe(s) to affirm whether the item is indeed resolved. Accordingly, the Tribe's enclosed comments speak to whether PG&E's determinations of resolution are accurate. These may require consultation to truly resolve.	With respect to the question as to the determination that a comment was "resolved," that determination was made after discussion of the comment in comment resolution meetings, which occurred between September 2013 and		DOI concurs with the PG&E account of the 60% Design RTC process. Sections of the design package that were deferred, noted at the 60% RTC stage as "... pending review of 90% design,", were	Comment considered resolved while noting that the SEIR must consider the final design. See also RTC 28 FMIT-14.	Comment considered resolved while noting that the SEIR must consider the final design

[13] See, for example of "Not applicable" in Table I-1, Item No. 7, last column.

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							February 2014. PG&E, Agencies, Tribes, and stakeholders participated in those meetings. The final 60% Master RTC table with attachments was sent to everyone on April 18, 2014. To PG&E's knowledge, no comments were received on the RTC table nor were there expressed disagreements with the resolution recorded in the RTC table at the time. Additionally, PG&E anticipates that the comments for which resolution was marked "pending review of 90% design" were either addressed in the 90% design or will be addressed through the 90% RTC process.		to be taken under consideration by the commenter/ interested party during the 90% BOD/Design Package and C/RAWP review.		
30	Hualapai					Native plants are an important part of the life cycle, sustaining the diet for humans and animals, as well as providing sources of healing. There is a need to protect native plants at Topock and foster their growth in the face of the onslaught of activities at Topock. The Hualapai Tribe has suggested garden plots at the site where native plants can be nurtured for replanting as part of restoration and decommissioning, but this suggestion was rejected by PG&E.	Creating gardens for native plants would increase the project footprint and require substantial material and labor inputs. This approach would only be justified where many more plants were needed for restoration than have actually been estimated. The anticipated restoration plant need can more technically and economically be met using existing commercial plant facilities in the area with locally collected seeds.			Nurturing of native plants could go hand-in-hand with restoration of the effects of the groundwater remedy; for example, native plants could be planted in restoration areas, plants could be used to prevent erosion of long-term soil stockpiles, which would also help to keep the soil alive. Clean soil from the project could be stored at staging area 5, and the soil could be contoured against the western hillside, covered with clay for protection, and native plants seeded upon the protected soil. With occasional watering, it seems like an efficient way to care for the displaced soil and to nurture native plants at the same time. This comment is considered unresolved.	DTSC response: Protection and avoidance of native plants is a priority during the remedy construction and through operation and maintenance of the remedy. DTSC will consider the mitigation measures necessary as part of the SEIR. Hualapai's preference is noted.

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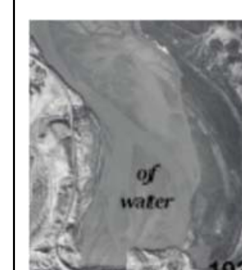
31	Hualapai					Geothermal water is sacred to the Hualapai Tribe, and pumping of geothermal water from well HNWR-1 is a desecration of this precious resource. We believe that the geothermal water at HNWR-1 comes from the sacred hot springs of the Black Mesa area (Warm Springs Wilderness Area), and that our ancestors performed ceremonies in the same water that now is being proposed for pumping and extraction. We believe that this geothermal water is a finite resource, floating on cool water near the confluence of Warm Springs Wash and the Mohave Valley. Pumping of water from well HNWR-1 will deplete this limited sacred resource, and when it has been depleted, it will take thousands of years to replenish. The Hualapai Tribe requests that water-quality and temperature conditions of the freshwater source wells should be monitored over time during implementation of the groundwater remedy, and the geothermal water should be treated with respect, for example by allowing the water to cool before being injected into the groundwater remedy.	Clarification provided during April TWG: Hualapai suggests that geothermal water is sacred, and the temperature of water pumped from HNWR or Site B will be elevated and should be cooled, if possible by natural means, before being used for industrial purposes. Response to clarified comment: High ambient temperatures during most of the year will prevent significant natural cooling of water pumped from HNWR or Site B. However, monitoring of water quality and temperature of freshwater will be conducted during groundwater implementation as discussed in Appendix L, Volume 2, Section 5.2 and Table 5.2.4.			Hualapai Tribe requests to be notified if water temperature from the freshwater well increases significantly. This comment is considered resolved pending verification of the notification procedure within 100% design.	This comment is considered resolved pending verification of the notification procedure within 100% design.
32	Hualapai					In regards to the proposed monitoring wells on the Arizona side of the Colorado River (MW X-Y), the Hualapai support FMIT in regards to their specific cultural affiliation through nomenclature. Hualapai oppose any wells being placed in that sacred traditional cultural property. We have attached a technical memo in this regard.		See RTC #17 FMIT-3.	See RTC #17 FMIT-3.	The historical aerial photos show that the proposed locations for these wells is a sacred place because it is of both land and water, 	RTCs related on MW-X/Y were discussed at the July 23, August 18, and August 26 TWG meetings. DTSC/DOI Response: See response to RTC #17

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										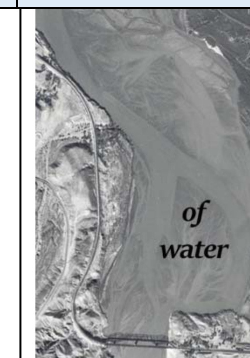 Within a confluence. Hualapai believe, even in contemporary times, that confluences and the landscape near-by are sacred. We agree with the Fort Mohave Tribe that this is a significant cultural place where no wells should be drilled.	
33	Hualapai					Use of soil storage and staging areas during the remedy will contribute dramatically to the overall cumulative impacts and destruction of the cultural landscape. We have worked diligently with the agencies to define acceptable storage and staging areas. However, storage and staging are still proposed within some of the most sacred areas of the cultural landscape, and we find this frustrating that despite objections from the Tribes, these staging areas remain as part of the proposed remedy. In regards to areas being selected, prior to consultations, during consultations and outside of consultations for staging and or construction and arsenic monitoring wells, we would like to take this opportunity to remind the agencies that the Advisory Council on Historic Preservation commented back in 2011, (December 5, 2011 Federal Property Management Section, Office of Federal Agency Programs, ACHP) that in regards to expertise, the "details…are best specified by those experts at the local and state level with the most familiarity with the site." Consultations as specified by Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470f, requires that, prior to approving the expenditure of any federal funds on undertaking with the potential to affect historic properties, or prior to issuing any license or other authorization for such an undertaking, the federal agency must engage in the consultation process mandated by NHPA section 106, a process that has been implemented through regulations issued by the Advisory Council on Historic Preservation, (36 C.F.R. part 800). We are aware that DTSC takes the perspective that the DTSC is not subject to S106, however there are best practices to consider, and continued consultation is of prime importance for the Hualapai. Specifically to storage and or construction staging areas, Tribal knowledge and preferences as specified by tribal experts at times, were not being considered by the agencies. For example, there were instances in which the Tribes, as a group, made decisions early-on and some of these decisions have been superseded by the DOI. In particular areas # 6 thru 8 were specified (January 14, 2014) as not acceptable, and that 16, was noted as not acceptable because it is too close to Loci B.	See RTC #18 FMIT-4.	See RTC #18 FMIT-4.	See RTC #18 FMIT-4.	As areas #6, 7, 12, and 13 are going to remain as options for staging, Hualapai formally states for the record, that 'Avoidance' still remains the most preferred option. We consider this RTC# 33 closed but not resolved.	RTCs related soil storage and construction staging areas were discussed at the July 23, August 19, and August 26 TWG meetings. The Agencies have provided a direct response to the Tribes regarding staging areas. DOI and will provide further direction to PG&E on staging and storage area usage.
34	Hualapai					After completion of the groundwater remedy, it is necessary that all elements of the remedy should be removed and decommissioned, and the land should be returned to its original condition. While the Tribes have previously indicated that decommissioning of wells and subsurface casings may cause additional damage to the earth, we feel that new technologies will be developed in the future that will provide for decommissioning of wells with less disturbance. In addition, many of the states (e.g. Kentucky and North Carolina) have mandated that abandoned wells must be decommissioned and removed. Therefore, we need to allow for flexibility in well decommissioning on a case-by-case basis, and in the event of future well decommissioning regulations in California, we should not allow these remedy wells to be grandfathered, hence bypassing any new requirements.	See RTC #12 DTSC-8.			The Basis of Design report language continues to incorporate uncertain plans for remedy infrastructure removal, for example, deferring to priorities and decisions of future land and agency managers. The granting of	See above for decommissioning.

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										easements for remedy infrastructure construction should include explicit requirements for the future removal of that infrastructure. It is realized that much of the detail for these issues cannot be made with certainty at this point, therefore this comment remains unresolved.	
35	Hualapai					In regards to cumulative impacts and our growing concern for the integrity of the entire Topock Cultural landscape, on December 16, 2013, Hualapai and other tribes presented a draft conceptual cultural resources mitigation document containing specific mitigation measures that Hualapai felt did address the intent of CEQA and actually mitigated to some degree cultural, religious, social and economic impacts, (reference CEQA § 15002(h), 15123(b)(3), 15270, and 15124(d)(1)(c), yet the DEIR as it is presented, did not address any of our suggested mitigations. We again, present these mitigation recommendations in this comment letter, with one additional suggestion. Also on September 5th, 2014, in a letter to DTSC and DOI (HDCR File 2014-741) Hualapai commented that "…analysis of the role of social change has been largely absent in prior CEQA analyses relative to Topock and has resulted in the minimization of certain potential impacts to the Tribe and its members, such as those related to noise, visual and aesthetics, among others and a failure to seek out, consider and analyze tribal views of significance and impacts for specific resources and impacts." We have again, attached those mitigation requirement here and hope that future activities at Topock could take into consideration CEQA to the extent that CEQA regulations require EIR's to define mitigation measure per the spirit of the law in regards to mitigating cumulative impacts. These are:[1] 1. Methods or plans to reduce, offset, or eliminate adverse project impacts. Action taken to avoid, reduce the severity of, or eliminate an adverse impact. Mitigation can include one or more of the following: 2. Avoiding impacts. 3. Minimizing impacts by limiting the degree or magnitude of an action. 4. Rectifying impacts by restoration, rehabilitation, or repair of the affected environment. 5. Reducing or eliminating impacts over time. 6. Compensating for the impact by replacing or providing substitute resources or environments to offset the loss. Mitigation measures affecting Resources of Tribal, Cultural, Religious, Social, and Use Values: 1. A biological survey of riparian habitat associated with the Topock Cultural landscape shall be conducted (by PG&E with tribes and or tribal representatives) bi-annually to document vegetation characteristics and conditions in order to determine if there are any long-term impacts of the project on the riparian habitat, and to determine if the project revegetation process is functioning. The findings of all biological surveys shall be submitted to the Tribes. These surveys should occur every year from start of soils remediation selection through the life of the remediation project in its entirety. 2. If any grading, clearing, brushing, or construction occurs during the bird breeding season (approximately February 15 through August 31), a qualified biologist, with tribal assistance, shall conduct a survey of the habitat to determine whether there are active bird nests in the area, including raptors and ground nesting birds. The survey would begin not more than three days prior the beginning of work. If an active nest is observed, a minimum 300-foot buffer (500 feet for raptors) would be established using temporary fencing. The buffer would be in effect as long as work is occurring and until the nest is no longer active. 3. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized to suppress dust emissions using typical methods such as: water, organic stabilizers / coverage with a tarp or other suitable material, or vegetative ground cover. All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized to suppress dust emissions using water or organic stabilizers. All land clearing, grubbing, scraping, excavation, land leveling, grading, cut/ fill, and demolition activities shall be effectively controlled		DTSC appreciates the input from the Hualapai regarding proposed mitigation measures to the draft soil investigation EIR. Those comments have been responded to as part of the final soil investigation EIR. DTSC will also consider any input from Tribes during the subsequent EIR comment period for the groundwater remedy design.		Hualapai will wait to receive a response as a part of the final soil investigation in regards to how agencies DTSC and PG&E are going to incorporate these suggested mitigation measures. Hualapai considers this RTC#35 un-resolved.	DTSC Response: Proposed Mitigation Measures are considered based on threshold of impacts in CEQA evaluation. Mitigation Measures will be considered in the SEIR if warranted.

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						of fugitive dust emissions utilizing application of water and/ or by presoaking. 4. When soil or similar materials are transported off-site, all material shall be covered, or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container shall be maintained. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. Use of blower devices is expressly prohibited. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized to suppress fugitive dust emissions utilizing sufficient water or organic stabilizers. Within urban areas, track out of mud or dirt onto public roads shall be immediately removed when it extends 50 or more feet from the site and at the end of each workday. Any site with 150 or more vehicle trips per day shall prevent carryout and track-out of mud or dirt onto public roads. 5. Physical disturbance within the Project area will occur to significant trails and will cut-off the ability of participating tribes to travel physically and spiritually along these trails. In consultation with participating tribes, extant trails in Topock Cultural Landscapes should be field mapped, and preserved by qualified cultural resource personnel with the assistance of participating tribes and or tribal representatives. Low-level aerial photography and video photography should be used to document trails that are within the APE and throughout the Topock Cultural Landscape. It appears from present information that certain trail corridors can be preserved, including routes to Spirit Mountain, Boundary Cone, and the Needles. 6. Physical disturbance within the Project area will occur to significant cultural resources including but not limited to, stone circles, rock cairns, stone scatters, trails, tool refining stations, spiritual teaching areas, minerals etc. In consultation with participating tribes, the entire Topock Cultural Landscapes should be field mapped, and preserved by qualified cultural resource personnel with the assistance of participating tribes and or tribal representatives. 7. Tribal Interpretive Centers. Provide financial support for tribal interpretive centers on tribal lands that describe, educate, and engage tribal communities in disseminating and preserving traditional cultural identity through tribal languages. Provide support through grants and phased funding, for tribal interpretive facilities/museums, language programs, and healthy food systems. Resulting programs could then be components for continued outreach and education to stakeholder/agency staff with linking cultural information at Topock. Grants to be phased over life of the remediation project. 8. Continue on-going reasonable compensation for tribal participation in monitoring, attending meetings, and participating in project development, as with the present Consultative Work Group, Technical Work Group, Clearinghouse Task Force, and subcommittee involvement. Funding support to continue through the life of the remediation clean-up project. 9. Create a trust fund for a Cultural Preserve at Topock. This would help in attempting to preserve the Topock Cultural Landscape in view of the encroaching Park Moabi tourist facility. Future generations. 10. Funding for increased security measures around the Topock Cultural Landscape. Due to tourism and increasing numbers of visitors to the Topock area. This also relates to recent vandalism at Grapevine Canyon. We do not want this to happen at Topock. 11. Funding support for education and technical training for tribal members. In conjunction with all of the above, provide for full higher-education tribal scholarships (two per educational year per participating tribe) for biology and / or ethnobotanical degrees, archaeology, hydrogeology, and museum studies. 12. Create a collaborative land management working group to include tribal and agency members to discuss; plan; and implement a long-term landscape management plan for the Topock Remediation Project area.					
36	FMIT/TRC	Design	Infrastructures		Overall Comment	The Tribes have repeatedly voiced a strong preference for aboveground installations of the remedy infrastructure, both verbally and in numerous written comments and letters regarding the 30% and 60% design documents. This preference has remained unchanged and is rooted in the strong desire to protect the ultimate condition and continuity of the subsurface of this sacred area, preserving it for future generations. Regardless, the ultimate decision for this remedy has placed essentially all ~5 miles of pipeline corridor below ground. This situation will result in permanent and irreparable adverse cumulative impacts throughout the Topock cultural landscape over the life of the project and into the future. Given the magnitude of the impact of this decision, the Tribes should be provided with a summary of the detailed, technical basis for this decision, which was deemed to override cultural and spiritual considerations.		See response in DOI column.	DOI and DTSC respectfully refer the Tribes to RTCs 159, 182, 183, 184, 185, and 188 - 193 from the 30% Design, RTCs 1, 8a & b, 9, 434a, 850, 852, 855, and 865 from the 60% Design, the DOI/ DTSC Direction letter to PG&E dated April 4, 2014	In spite of the consultation and the RTC processes at 30% and 60%, the fact is that the cumulative disturbance footprint of the project has only gradually taken form as the design has progressed, has grown as that designed changed and has only gradually become evident to Tribal staff	DTSC response: See 4/4/2014 direction letter to PG&E . Additionally, see RTCs #8 DTSC-4, #12 DTSC-8, and #16 FMIT-2. The Tribes have been afforded the opportunity to use the TRC and technical consultants to clarify technical

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									and the associated Pipeline Matrix. Presentations provided and discussions held at the Technical Working Group meetings (Refer to materials/agendas provided for 5/22/13, 6/13/13, 9/17/13, 12/27/13, 1/23/14 and 2/11/14). DOI and BLM also held consultation meetings on 3/8/12, 5/23/13, 12/17/13 and 1/14/14 that included technical discussions regarding above/ below ground pipelines. Also see RTC #15 FMIT-1.	and leaders, few if any of whom are technical specialists in these matters, and this strong preference remains. Moreover, the agencies 'specific rationale in its "balancing" and "independent judgment" to override Tribal concerns has still not been well laid out or to the Tribe's satisfaction. Therefore, this comment remains unresolved.	design issues with their staff and leaders.
37	Hualapai/TRC	Design	Infrastructures		Overall Comment	The Tribes have repeatedly voiced a strong preference for aboveground installations of the remedy infrastructure, both verbally and in numerous written comments and letters regarding the 30% and 60% design documents. This preference has remained unchanged and is rooted in the strong desire to protect the ultimate condition and continuity of the subsurface of this sacred area, preserving it for future generations. Regardless, the ultimate decision for this remedy has placed essentially all ~5 miles of pipeline corridor below ground. This situation will result in permanent and irreparable adverse cumulative impacts throughout the Topock cultural landscape over the life of the project and into the future. Given the magnitude of the impact of this decision, the Tribes should be provided with a summary of the detailed, technical basis for this decision, which was deemed to override cultural and spiritual considerations.		See above	See above	In spite of the consultation and the RTC processes at 30% and 60%, the fact is that the cumulative disturbance footprint of the project has increased as the design has progressed. Hualapai respectfully refers agencies to the Programmatic Agreement, as ultimately, PG&E will be responsible for removing structure related to the remediation project. The P.A. states, "All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. All such removal will be planned in consultation with the Signatories, Tribes, and Invited Signatories	DTSC/DOI Response: See 4/4/2014 direction letter to PG&E . Additionally, see RTCs #8 DTSC-4, #12 DTSC-8, and #16 FMIT-2.

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										following the guidelines in Appendix B" (P.A. Section V. Removal of Existing Treatment Plant and Other Remediation Facilities). Since this project is not over yet, this RTC#37 will remain open and un-resolved.	
38	Cocopah/TRC	Design	Infrastructures		Overall Comment	The Tribes have repeatedly voiced a strong preference for aboveground installations of the remedy infrastructure, both verbally and in numerous written comments and letters regarding the 30% and 60% design documents. This preference has remained unchanged and is rooted in the strong desire to protect the ultimate condition and continuity of the subsurface of this sacred area, preserving it for future generations. Regardless, the ultimate decision for this remedy has placed essentially all ~5 miles of pipeline corridor below ground. This situation will result in permanent and irreparable adverse cumulative impacts throughout the Topock cultural landscape over the life of the project and into the future. Given the magnitude of the impact of this decision, the Tribes should be provided with a summary of the detailed, technical basis for this decision, which was deemed to override cultural and spiritual considerations.		See above	See above	In spite of the consultation and the RTC processes at 30% and 60%, the fact is that the cumulative disturbance footprint of the project has only gradually taken form as the design has progressed, and has only gradually become evident to Tribal staff and leaders, few if any of whom are technical specialists in these matters, and this strong preference remains. Therefore, this comment remains unresolved.	This RTC was discussed at the August 19 TWG meeting. DTSC response: See 4/4/2014 direction letter to PG&E.
39	Chemehuevi/ TRC	Design	Infrastructures		Overall Comment	The Tribes have repeatedly voiced a strong preference for aboveground installations of the remedy infrastructure, both verbally and in numerous written comments and letters regarding the 30% and 60% design documents. This preference has remained unchanged and is rooted in the strong desire to protect the ultimate condition and continuity of the subsurface of this sacred area, preserving it for future generations. Regardless, the ultimate decision for this remedy has placed essentially all ~5 miles of pipeline corridor below ground. This situation will result in permanent and irreparable adverse cumulative impacts throughout the Topock cultural landscape over the life of the project and into the future. Given the magnitude of the impact of this decision, the Tribes should be provided with a summary of the detailed, technical basis for this decision, which was deemed to override cultural and spiritual considerations.		See above	See above	In spite of the consultation and the RTC processes at 30% and 60%, the fact is that the cumulative disturbance footprint of the project has only gradually taken form as the design has progressed, and has only gradually become evident to Tribal staff and leaders, few if any of whom are technical specialists in these matters, and this strong preference remains. Therefore, this comment remains unresolved.	See 4/4/2014 direction letter to PG&E . Additionally, see RTCs #8 DTSC-4, #12 DTSC-8, and #16 FMIT-2.
40	FMIT/TRC	Design	Infrastructures		Overall Comment	Since 2007, the Tribes have made very clear that the area across the river in AZ was extremely sensitive and a named, traditional historic place. The Arizona SHPO and ADEQ affirmed this position. In spite of this, yet again wells are proposed for this same area, with little technical basis. There appears to be no compelling reason or technical argument to over-ride such strong Tribal objections.		See RTC #17 FMIT-3. PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates	See RTC #17 FMIT-3.	FMIT strongly requests that no wells be placed in the vicinity of the White Clay area, not only because this is a sacred area, but also because of the poor technical justification for the need, number and locations of these wells.	This RTC was discussed at the July 23, August 18, and August 26 TWG meetings. DTSC/DOI Response: See RTC #17, FMIT-3.

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								that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.		Prucha and Eggers, July 15, 2015 MW-X/MW-Y whitepaper identified a number of problems with the underlying model, used to determine MW-X/MW-Y locations, number (i.e., x2) and provides many recommendations to better understand the hydraulic connectivity between California and Arizona groundwater and to improve a flawed model, which doesn't simulate flows correctly, which only adds to the significant overall uncertainty associated with flows beneath the river and within Arizona. Numerous problems identified with the present model setup should be fixed now, before attempting to determine whether MW-X and MW-Y are needed, optimal number (i.e., are 2 really needed), and optimal locations. We continue to believe that the most likely location for any flow beneath the river would be from the MW-34 area towards existing Arizona wells MW-54, MW- 55 and MW-56. See **Attachment CC** summarizing responses to CH2MHill August 14, 2015 review of the Prucha and Eggers whitepaper. The Tribe looks forward to additional discussions and consultations with DOI and other agencies on this issue. Therefore, the comment remains open.	
41	Hualapai/TRC	Design	Infrastructures		Overall Comment	Since 2007, the Tribes have made very clear that the area across the river in AZ was extremely sensitive and a named, traditional historic place. The Arizona SHPO and ADEQ affirmed this position. In spite of this, yet again wells are proposed for this same area, with little technical basis.		See above	See above	Hualapai strongly requests that no wells be placed in the vicinity	RTCs related to MW-X/Y were discussed at the July 23,

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						There appears to be no compelling reason or technical argument to over-ride such strong Tribal objections.				of the White Clay, not only because this is a sacred area but also because of the poor technical justification for the need, number and locations of these wells. Prucha and Eggers, July 15, 2015 MW-X/MW-Y whitepaper identified a number of problems with the underlying model, used to determine MW-X/MW-Y locations, number (i.e., x2) and provides many recommendations to better understand the hydraulic connectivity between California and Arizona groundwater and to improve a flawed model, which doesn't simulate flows correctly, which only adds to the significant overall uncertainty associated with flows beneath the river and within Arizona. Numerous problems identified with the present model setup should be fixed now, before attempting to determine whether MW-X and MW-Y are needed, optimal number (i.e., are 2 really needed), and optimal locations. We continue to believe that the most likely location for any flow beneath the river would be from the MW-34 area towards existing Arizona wells MW-54, MW- 55 and MW-56. See **Attachment CC** summarizing responses to CH2MHill August 14, 2015 review of the Prucha and Eggers whitepaper.	August 18, and August 26 TWG meetings. DTSC/ DOI response: See RTC #17, FMIT-3.
42	Cocopah/TRC	Design	Infrastructures		Overall Comment	Since 2007, the Tribes have made very clear that the area across the river in AZ was extremely sensitive and a named, traditional historic place. The Arizona SHPO and ADEQ affirmed this position. In spite of this, yet again wells are proposed for this same area, with little technical basis.		See above	See above	FMIT strongly requests that no wells be placed in the vicinity of the	This RTC was discussed at the July 23, August 18, and

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						There appears to be no compelling reason or technical argument to over-ride such strong Tribal objections.				White Clay, not only because this is a sacred area but also because of the poor technical justification for the need, number and locations of these wells. Prucha and Eggers, July 15, 2015 MW-X/MW-Y whitepaper identified a number of problems with the underlying model, used to determine MW-X/MW-Y locations, number (i.e., x2) and provides many recommendations to better understand the hydraulic connectivity between California and Arizona groundwater and to improve a flawed model, which doesn't simulate flows correctly, which only adds to the significant overall uncertainty associated with flows beneath the river and within Arizona. Numerous problems identified with the present model setup should be fixed now, before attempting to determine whether MW-X and MW-Y are needed, optimal number (i.e., are 2 really needed), and optimal locations. We continue to believe that the most likely location for any flow beneath the river would be from the MW-34 area towards existing Arizona wells MW-54, MW- 55 and MW-56. See **Attachment CC** summarizing responses to CH2MHill August 14, 2015 review of the Prucha and Eggers whitepaper.	August 26 TWG meetings. DTSC/DOI Response: See RTC #17, FMIT-3.
43	Chemehuevi/ TRC	Design	Infrastructures		Overall Comment	Since 2007, the Tribes have made very clear that the area across the river in AZ was extremely sensitive and a named, traditional historic place. The Arizona SHPO and ADEQ affirmed this position. In spite of this, yet again wells are proposed for this same area, with little technical basis. There appears to be no compelling reason or technical argument to over-ride such strong Tribal		See above	See above	FMIT strongly requests that no wells be placed in the vicinity of the White Clay, not only	RTCs related to MW-X/Y were discussed at the July 23, August 18, and

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						objections.				because this is a sacred area but also because of the poor technical justification for the need, number and locations of these wells. Prucha and Eggers, July 15, 2015 MW-X/MW-Y whitepaper identified a number of problems with the underlying model, used to determine MW-X/MW-Y locations, number (i.e., x2) and provides many recommendations to better understand the hydraulic connectivity between California and Arizona groundwater and to improve a flawed model, which doesn't simulate flows correctly, which only adds to the significant overall uncertainty associated with flows beneath the river and within Arizona. Numerous problems identified with the present model setup should be fixed now, before attempting to determine whether MW-X and MW-Y are needed, optimal number (i.e., are 2 really needed), and optimal locations. We continue to believe that the most likely location for any flow beneath the river would be from the MW-34 area towards existing Arizona wells MW-54, MW- 55 and MW-56. See **Attachment CC** summarizing responses to CH2MHill August 14, 2015 review of the Prucha and Eggers whitepaper.	August 26 TWG meetings. DTSC/DOI Response: See RTC #17, FMIT-3.
44	FMIT/TRC	Non-design	Process		Overall Comment	Numerous examples exist within the 90% BOD report indicating that many final design decisions will be determined post the design phase of the project. For example the final locations of many wells and pipeline runs, determination of whether the system is OPS, determination regarding the need and installation of provisional wells, and decisions on the timing and use of monitored natural attenuation are just a few of the many examples of final design decisions that will be made after			DOI concurs with the PG&E response.	The Tribe as a landowner, Indian Tribe with religious connection to the project property and a	A similar RTC (RTC #46) was discussed at the August 18 TWG meeting.

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						the finalization of the project design. Specific referenced examples of these post design phase decisions found throughout the 90% BOD report have been provided (1a-1s) and are found as an attachment to this comment. This list should be considered as some examples found in the report but is not intended to be considered comprehensive. Please clearly discuss how data collected post the design phase of the groundwater remediation could result in changes to infrastructure locations that are different than the locations presented within the BOD reports. In addition please clearly outline how the Tribes will be involved in final design decisions that are made post approval of the 100% BOD report. Any future deviations from the infrastructure locations determined during the design phase necessitates Tribal involvement at a level that has been established during the design process. Therefore please clearly describe how the Tribes will be part of data review post design phase and the forum in which Tribes will be involved in design phase decisions made after finalization of the BOD report.	Discoveries made during construction and start-up could result in changes to infrastructure locations. These include discovery of human remains or burials, previously unidentified potentially significant cultural, historic, or paleontological resources or listed species, groundwater quality data or soil data, etc. See Table 5.1-1 of the Construction Contingency Plan (Section 5 of the C/RAWP) for a listing of potential contingencies due to issues that may arise during construction and start-up, and proposed mitigation. As mentioned in Table 5.1-1, the lack of site-specific subsurface data (e.g., certain groundwater quality data, certain hydrogeologic data, supplemental geotechnical data, soil conditions) during design could lead to later discovery during construction of site conditions that render the design non-compliant with codes, laws, regulations and/or engineering standard of practice, planned well locations and/or constructions fail to meet the project objectives, etc. Typically, these subsurface data would be collected during the design phase. Here, these subsurface data were not collected during design to minimize ground disturbance prior to	DTSC will continue periodic consultative workgroup meetings, technical workgroup meetings, and the clearinghouse taskforce meetings. Although the frequencies and duration of these meetings may be adjusted based on need and number of agenda items. In addition to regular meetings and construction oversight, DTSC may also meet with the Tribes when requested regarding specific issues. Furthermore, DTSC has also adopted specific mitigation measures as part of		government entity reiterates its strong desire to be included along with DOI and DTSC as primary parties to whom communication is addressed if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape or Tribal property. PG&E should remain mindful of its independent legal obligations under the 2006 Settlement Agreement to consult with FMIT and to provide all non-attorney-client privileged material information, documentary or otherwise, to the Tribe contemporaneously with its receipt or development by PG&E.	DTSC Response: Tribal comment noted.

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							construction. The only exceptions to the curtailment of intrusive filed data collection were the alternative freshwater evaluation and the potholing for underground utilities. The curtailed data collection efforts have been combined with construction and/or soil investigation activities. To minimize the potential for uncertainties in the conceptual site model to cause unnecessary disturbance (that is, to avoid constructing unnecessary infrastructure), measures such as scheduling data collection at planned Category 1 well locations early in the construction schedule (see Section 3.2.1.3 of C/RAWP) and combining the collection of geotechnical data with the upcoming soil investigation were proposed. Communication and outreach are key elements of all phases of remedy implementation. A summary of communication procedures and protocols to be used during the construction and startup, as well as operation and maintenance of the groundwater remedy is presented in Table 2.3-1 of the C/RAWP and Exhibit L2.2-1 of the O&M Manual, respectively. The communication procedures and protocols are intended to be used by the PG&E Topock project team to inform and/or seek input from agencies, stakeholders, and Tribes; to seek approvals from	the 2011 certified FEIR that include additional Tribal coordination during the construction and O&M phase of the project (i.e. CIMP). Finally, if agencies determine that changes to operation are necessary based on Five Year reviews, DTSC will also notify the Tribes for input.			

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							agencies; to resolve issues; and to comply with certain requirements. The summary is a compilation of PG&E's obligations for formal communication to certain parties during this phase of work that is specified in various directives from, and agreements with, State and Federal Agencies, state and federal laws, Memoranda of Understanding ("MOUs") with certain Tribes, the 2006 Settlement Agreement with the FMIT, and other required project documents. In general, communications occur in two forms -- routine (regular periodic communication) and non-routine (communication when the project experiences unexpected changes during construction, startup, or O&M). Examples of routine communication include monthly progress reports during construction and start-up, and quarterly progress reports during O&M submitted to DTSC and DOI and Tribal outreach, including, for example, regarding scheduled field activities. Examples of non-routine communications include requests for a work variance in the event of a material deviation to the C/RAWP or design documents. For example, during construction, routine monthly progress reports will be a key tool for PG&E to inform agencies, stakeholders,				

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)

Groundwater Remedy Basis of Design Report/Final (100%) Design

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							and Tribes of work completed, forecasted work, issues encountered, actions taken to rectify problems/issues, personnel changes, variance requests to the agencies to deviate from design documents or C/RAWP, agencies' actions, etc. See Exhibit 2.6-2 of the C/RAWP (Monthly Progress Report Template) for additional details. The monthly reports will be submitted to DTSC and DOI, and posted on a SharePoint site for access by Tribes and stakeholders (Section 2.6.4.2 of the C/RAWP [Retention and Reporting]). In addition, PG&E will continue to conduct outreach with the Tribes under the terms of any MOUs in effect with various Tribes, the 2006 Settlement Agreement with the FMIT, protocols specified in the CIMP, and additional protocols under communication-related EIR mitigation measures, including, but not limited to: • CIMP § 2.1: Protocols for continued communication. • CIMP § 2.3: Protocols for the review of cultural resource-related documents throughout the design, construction, and operational phases. • CIMP § 2.10: Protocols for Tribal notification in advance of project-related activities. • CIMP § 2.12: Protocols for Tribal Monitors to				

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							observe ground disturbing activities. • EIR Mitigation Measure CUL-1a-4: PG&E will continue to work with the representative members of Tribes through the Technical Review Committee during final design and remedy construction, at which time DTSC will determine the committee's status. • PA Appendix C – Monitoring Protocol/CHPMP §§ 6.6.4: Protocols for Tribal Monitors to observe ground disturbing activities. PG&E currently holds monthly meetings with Tribes to address current issues and provide a forecast of upcoming activities. Other communications may take place depending on purpose of the communication and type of information to be exchanged. Tribes are welcome to request discussions of specific topics or information that are of interested to the Tribes during these information exchanges. In the event of a material deviation from the design documents and/or C/RAWP due to discovery of site conditions discussed above, PG&E will formally submit a request for work variance to the agencies (see Table 2.3-1 of C/RAWP and Exhibit L.2.2-3 of the O&M Manual). In response to comment #907 JDS-1,				

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							PG&E will also notify the FMIT when a work variance request for material deviation on the FMIT property is submitted to the agencies. Such requests and agencies' actions will be included in the monthly progress reports.				
45	Hualapai/TRC	Non-design	Process		Overall Comment	Numerous examples exist within the 90% BOD report indicating that many final design decisions will be determined post the design phase of the project. For example the final locations of many wells and pipeline runs, determination of whether the system is OPS, determination regarding the need and installation of provisional wells, and decisions on the timing and use of monitored natural attenuation are just a few of the many examples of final design decisions that will be made after the finalization of the project design. Specific referenced examples of these post design phase decisions found throughout the 90% BOD report have been provided (1a-1s) and are found as an attachment to this comment. This list should be considered as some examples found in the report but is not intended to be considered comprehensive. Please clearly discuss how data collected post the design phase of the groundwater remediation could result in changes to infrastructure locations that are different than the locations presented within the BOD reports. In addition please clearly outline how the Tribes will be involved in final design decisions that are made post approval of the 100% BOD report. Any future deviations from the infrastructure locations determined during the design phase necessitates Tribal involvement at a level that has been established during the design process. Therefore please clearly describe how the Tribes will be part of data review post design phase and the forum in which Tribes will be involved in design phase decisions made after finalization of the BOD report.	See above	See above	See above	Hualapai reiterates the need to be included (along with DOI and DTSC) as a primary party in communications regarding all project design changes, or work variance requests including material deviations from the design documents and/or C/RAWP due to discovery of changed site conditions as discussed in these earlier comments (at left). Communicating these changes needs to occur as soon as it is known that a change needs to be made. Hualapai needs to be included in those discussions via informing a tribal monitor, or email or telephone calls to designated points of contact. Once the change has been approved then a formal document can be forwarded to Hualapai.	A similar RTC (RTC #46) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.
46	Cocopah/TRC	Non-design	Process		Overall Comment	Numerous examples exist within the 90% BOD report indicating that many final design decisions will be determined post the design phase of the project. For example the final locations of many wells and pipeline runs, determination of whether the system is OPS, determination regarding the need and installation of provisional wells, and decisions on the timing and use of monitored natural attenuation are just a few of the many examples of final design decisions that will be made after the finalization of the project design. Specific referenced examples of these post design phase decisions found throughout the 90% BOD report have been provided (1a-1s) and are found as an attachment to this comment. This list should be considered as some examples found in the report but is not intended to be considered comprehensive. Please clearly discuss how data collected post the design phase of the groundwater remediation could result in changes to infrastructure locations that are different than the locations presented within the BOD reports. In addition please clearly outline how the Tribes will be involved in final design decisions that are made post approval of the 100% BOD report. Any future deviations from the infrastructure locations determined during the design phase necessitates Tribal involvement at a level that has been established during the design process. Therefore please clearly describe how the Tribes will be part of data review post design phase and the forum in which Tribes will be	See above	See above	See above	The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties that communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level	This RTC was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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						involved in design phase decisions made after finalization of the BOD report.				of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	
47	Chemehuevi/ TRC	Non-design	Process		Overall Comment	Numerous examples exist within the 90% BOD report indicating that many final design decisions will be determined post the design phase of the project. For example the final locations of many wells and pipeline runs, determination of whether the system is OPS, determination regarding the need and installation of provisional wells, and decisions on the timing and use of monitored natural attenuation are just a few of the many examples of final design decisions that will be made after the finalization of the project design. Specific referenced examples of these post design phase decisions found throughout the 90% BOD report have been provided (1a-1s) and are found as an attachment to this comment. This list should be considered as some examples found in the report but is not intended to be considered comprehensive. Please clearly discuss how data collected post the design phase of the groundwater remediation could result in changes to infrastructure locations that are different than the locations presented within the BOD reports. In addition please clearly outline how the Tribes will be involved in final design decisions that are made post approval of the 100% BOD report. Any future deviations from the infrastructure locations determined during the design phase necessitates Tribal involvement at a level that has been established during the design process. Therefore please clearly describe how the Tribes will be part of data review post design phase and the forum in which Tribes will be involved in design phase decisions made after finalization of the BOD report.	See above	See above	See above	The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties that communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	A similar RTC (RTC #46) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.
48	FMIT/TRC	Design	Infrastructures		Overall Comment	The treatment of noise during the construction period is well developed in the CIMP (CUL-1a-8h in Appendix H of the C/RAWP), but this is at odds with language regarding exemption for San Bernardino County noise regulations as stated in Appendix C-11 of the 90% BODBOD Report. The Appendix C-11 criteria need to be stricken from the BOD Report. Noise impacts related to backup generators, TEGs, pump and emitter operation at the water evaporation ponds need to be quantified, as this facility will have cumulative negative impacts on the soundscape at the Topock Maze and the Topock cultural landscape.	Please see RTC #23 FMIT-9. As with other equipment, equipment at the ponds are designed/specified to comply with the noise design criteria (Section C.11 of Appendix C). The ponds are located on the Refuge; therefore, the operational noise criteria is 60 dB(A). In addition, the operational noise will also comply with applicable San Bernardino County Development Code 83.01.080 for acceptable exterior noise standards for place of worship, which is 55 dB(A) Leq daytime (7 a.m.-10 p.m.) and 45 dB(A) Leq nighttime (10 p.m.-7 a.m.) (Leq is the equivalent average hourly noise level) (See EIR, Vol. 2, p. 4.9-24 [DTSC 2011]). The noise			The comment response is unsatisfactory because cumulative project noise impacts remain unquantified and unknown. Therefore, this comment remains unresolved. See also Tribal comment at RTC 23 FMIR-9. While not requesting additional mitigation, the Tribe respectfully disagrees with PG&E's opinion on nexus particularly considering cumulative effects under CEQ A and notes the agencies have an independent obligation to fully consider all project impacts.	DTSC Response: Comment noted. Noise impact evaluations are based on established regulatory thresholds. Noise impact is a resource area that DTSC will consider in the upcoming SEIR.

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						Sound power levels of new electrical generation equipment at the TCS need to be quantified, in relationship to sound power levels of existing equipment at the TCS.	measurement locations will be at the edge of the Maze closest to the subject facilities and at the short-term ambient noise measurement locations (ST-1, ST-2, and ST-3) in Exhibit 4.9-2 of the certified EIR (DTSC 2011). The noise design criteria are consistent with the noise mitigation measures in the EIR and supplemented by protocols to reduce auditory impacts in the CIMP. PG&E must implement the EIR mitigation measures and the CIMP protocol. Designing equipment to meet the design criteria prevents the equipment from creating direct and cumulative impacts more severe than those disclosed in the EIR. For this reason, the noise generated by various pieces of equipment does not need to be individually quantified. The TCS, including its new electrical generation equipment, is not part of the project. Although the remedy project's equipment may increase ambient noise levels, the project's contribution to cumulative noise impacts would remain as disclosed in the EIR. Additional mitigation measures to control noise from the TCS would lack a nexus to the proposed project.				
49	Hualapai/TRC	Design	Infrastructures		Overall Comment	The treatment of noise during the construction period is well developed in the CIMP (CUL-1a-8h in Appendix H of the C/RAWP), but this is at odds with language regarding exemption for San Bernardino County noise regulations as stated in Appendix C-11 of the 90% BODBOD Report. The Appendix C-11 criteria need to be stricken from the BOD Report. Noise impacts related to backup generators, TEGs, pump and emitter operation at the water evaporation ponds need to be quantified, as this facility will have cumulative negative impacts on the soundscape at the Topock Maze and the Topock cultural landscape. Sound power levels of new electrical generation equipment at the TCS need to be quantified, in	See above			The comment response is unsatisfactory because cumulative project noise impacts remain unquantified and unknown. Therefore, this comment remains unresolved.	DTSC Response: Comment noted. Noise impact evaluations are based on established regulatory thresholds. Noise impact is a resource area that DTSC will consider in the

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						relationship to sound power levels of existing equipment at the TCS.					upcoming SEIR.
50	Cocopah/TRC	Design	Infrastructures		Overall Comment	The treatment of noise during the construction period is well developed in the CIMP (CUL-1a-8h in Appendix H of the C/RAWP), but this is at odds with language regarding exemption for San Bernardino County noise regulations as stated in Appendix C-11 of the 90% BODBOD Report. The Appendix C-11 criteria need to be stricken from the BOD Report. Noise impacts related to backup generators, TEGs, pump and emitter operation at the water evaporation ponds need to be quantified, as this facility will have cumulative negative impacts on the soundscape at the Topock Maze and the Topock cultural landscape. Sound power levels of new electrical generation equipment at the TCS need to be quantified, in relationship to sound power levels of existing equipment at the TCS.	See above			The comment response is unsatisfactory because cumulative project noise impacts remain unquantified and unknown. Therefore, this comment remains unresolved.	DTSC Response: Comment noted. Noise impact evaluations are based on established regulatory thresholds. Noise impact is a resource area that DTSC will consider in the upcoming SEIR.
51	Chemehuevi/ TRC	Design	Infrastructures		Overall Comment	The treatment of noise during the construction period is well developed in the CIMP (CUL-1a-8h in Appendix H of the C/RAWP), but this is at odds with language regarding exemption for San Bernardino County noise regulations as stated in Appendix C-11 of the 90% BODBOD Report. The Appendix C-11 criteria need to be stricken from the BOD Report. Noise impacts related to backup generators, TEGs, pump and emitter operation at the water evaporation ponds need to be quantified, as this facility will have cumulative negative impacts on the soundscape at the Topock Maze and the Topock cultural landscape. Sound power levels of new electrical generation equipment at the TCS need to be quantified, in relationship to sound power levels of existing equipment at the TCS.	See above			The comment response is unsatisfactory because cumulative project noise impacts remain unquantified and unknown. Therefore, this comment remains unresolved.	DTSC Response: Comment noted. Noise impact evaluations are based on established regulatory thresholds. Noise impact is a resource area that DTSC will consider in the upcoming SEIR.
52	FMIT/TRC	Design	Infrastructures		Overall Comment	The BOD Report, the C/RAWP, the CIMP, the CHPMP, and the project plans and specifications should have sections that clearly and consistently identify the coordinate systems (and any scale factors) being used on the project as they relates to both horizontal and vertical coordinates. Also, there should be a set of 5 to 10 +/- vertical and horizontal control points established throughout the site where the various users of various GPS and other positioning instrumentation can check their equipment at any time to verify that the instrumentation is working correctly. These steps will help to reduce incorrect positioning during construction and during the operational life of the project when it comes to field positioning. Sites selected shall be chosen to be free, as much as possible, from construction/operations/maintenance disturbance, with a clear view of the sky in all directions, and free, to the greatest extent possible of nearby walls of surfaces likely to create multi-path positioning errors. Information on locations and coordinates shall be made available to all Tribes and stakeholders.	Sufficient monuments currently exist at Topock to provide for 'land survey' accuracy. An additional monument(s) would introduce unnecessary new ground disturbance. Section C.2.1 of Appendix C lists the project vertical and horizontal datum. Temporary control points will be placed and surveyed in during construction and will be included in the as-built drawings. Handheld GPS units using the same coordinate system which PG&E uses can provide the necessary accuracy non-surveyors would require. Additional details on the coordinate system which PG&E and its contractors will use can be added to the BOD (e.g., Section C.2.1 [Site Civil Datum] of Appendix C [Design Criteria]) and/or C/RAWP (e.g., Section 4).		DOI concurs with the PG&E response.	The Tribe will consider the utility of the conventions described by PG&E.	DTSC Response: It is PG&E's responsibility to construct the remedy system in compliance with all applicable requirements and prescribed mitigation measures.
53	Hualapai/TRC	Design	Infrastructures		Overall Comment	The BOD Report, the C/RAWP, the CIMP, the CHPMP, and the project plans and specifications should have sections that clearly and consistently identify the coordinate systems (and any scale factors) being used on the project as they relates to both horizontal and vertical coordinates. Also, there should be a set of 5 to 10 +/- vertical and horizontal control points established throughout the site where the various users of various GPS and other positioning instrumentation can check their equipment at any time to verify that the instrumentation is working correctly. These steps will	See above		See above.		

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						help to reduce incorrect positioning during construction and during the operational life of the project when it comes to field positioning. Sites selected shall be chosen to be free, as much as possible, from construction/operations/maintenance disturbance, with a clear view of the sky in all directions, and free, to the greatest extent possible of nearby walls of surfaces likely to create multi-path positioning errors. Information on locations and coordinates shall be made available to all Tribes and stakeholders.					
54	Cocopah/TRC	Design	Infrastructures		Overall Comment	The BOD Report, the C/RAWP, the CIMP, the CHPMP, and the project plans and specifications should have sections that clearly and consistently identify the coordinate systems (and any scale factors) being used on the project as they relates to both horizontal and vertical coordinates. Also, there should be a set of 5 to 10 +/- vertical and horizontal control points established throughout the site where the various users of various GPS and other positioning instrumentation can check their equipment at any time to verify that the instrumentation is working correctly. These steps will help to reduce incorrect positioning during construction and during the operational life of the project when it comes to field positioning. Sites selected shall be chosen to be free, as much as possible, from construction/operations/maintenance disturbance, with a clear view of the sky in all directions, and free, to the greatest extent possible of nearby walls of surfaces likely to create multi-path positioning errors. Information on locations and coordinates shall be made available to all Tribes and stakeholders.	See above		See above.		
55	Chemehuevi/ TRC	Design	Infrastructures		Overall Comment	The BOD Report, the C/RAWP, the CIMP, the CHPMP, and the project plans and specifications should have sections that clearly and consistently identify the coordinate systems (and any scale factors) being used on the project as they relates to both horizontal and vertical coordinates. Also, there should be a set of 5 to 10 +/- vertical and horizontal control points established throughout the site where the various users of various GPS and other positioning instrumentation can check their equipment at any time to verify that the instrumentation is working correctly. These steps will help to reduce incorrect positioning during construction and during the operational life of the project when it comes to field positioning. Sites selected shall be chosen to be free, as much as possible, from construction/operations/maintenance disturbance, with a clear view of the sky in all directions, and free, to the greatest extent possible of nearby walls of surfaces likely to create multi-path positioning errors. Information on locations and coordinates shall be made available to all Tribes and stakeholders.	See above		See above.		
56	FMIT/TRC	Choose an item.	SOPs		Overall Comment	At present, there appears to be little or no explicit future role for the Tribes when it comes to review of significant (to the Tribes) changes that may occur during the bid-, construction-, start-up-, or operations & maintenance periods of the project. This should be remedied with a standard operating procedure, protocol or some other suitable document that contains appropriate and acceptable language to remedy this situation. The following elements should be included. Tribal consultation will be conducted beginning after finalization and Agency approval of the 100% Topock Groundwater Remediation Project Basis of Design (BOD) Report, Construction/Remedial Action Work Plan (C/RWAP), and construction plans & specifications, referred to herein as the 100% Documents, and continue to be in effect and applicable to all remedy activities, including operations and maintenance activities, through completion of remedy decommissioning. Prior to the approval of the 100% Documents, there has been an opportunity for Tribal Representatives to review the remedial design documents and provide input in the form of review comments. Tribal participation and consultation during the development of these documents was crucial in ensuring that adverse effects on cultural, archaeological, and historical resources were either avoided or minimized to the extent practicable. This level of Tribal participation during the preparation of the 100% Documents has reduced the level of cultural impacts associated with the implementation of the groundwater remedy during the planned construction and operation & maintenance (O&M) periods. Continuation of that participation at a similar level is essential. Additionally, the Tribes should have an agreed-upon role and level of involvement in the review of data collected during remedy construction and O&M, after Agency approval of the 100% Documents, because that information may be relevant to changes to the remedy implementation or to remedy O&M that may be made going forward from the time of that Agency approval. It is expected that, during remedy well installation and testing, after system start-up, and during remedy operation, data will be collected and analyzed to evaluate whether the groundwater flow, geochemical, and solute transport models do not differ significantly from the conceptual site model with respect to the hydrogeologic characterization or remedy performance. If there are significant differences, the groundwater flow model, geochemical model, and/or the solute transport model will be updated and recalibrated. In addition data will be collected from monitoring and injection	PG&E appreciates the comment and understands that the Tribes are concerned about continued involvement in the project post design approval. The Tribes have and continue to be important stakeholders for the project. As mentioned in RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/TRC, PG&E will continue to implement the adopted mitigation measures, which include multiple requirements for Tribe monitoring and outreach/coordination with Tribes during project implementation, including the protocols for continued communication and tribal communication set forth in the CIMP that is required pursuant to EIR Mitigation Measure CUL-	See RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC above.	As noted by PG&E, there are several existing documents that provided guidance and protocols for continued communication and consultation with the Tribes. Should specific topics necessitate additional Section 106 consultation during comment resolution or construction (e.g., reinitiating of consultation pursuant to the PA's Consultation Protocol on the Arizona wells) or should a Tribe request consultation on specific issues such consultation will be conducted pursuant to the PA. BLM and DOI will be working with	Relative to PG&E's comment on review of final design, please see Tribal comment at RTC 28 FMIT-14. The Tribe also is of the understanding that DOI will discuss specific project mitigation with the Tribe once the final design is completed.	A similar RTC (RTC #58) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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						wells to establish baseline conditions and to provide insight into whether and why future modifications to the remedy or to its O&M will be required to optimize the remedy performance. The Tribes will be on a footing equivalent to other stakeholders regarding communications concerning the review of data collected during construction of the groundwater remedy well network, model updates and monthly progress reporting. This communication will help further reduce cultural impacts associated with the implementation of the final groundwater remedial design. In addition, consultation with the Tribes will be held prior to deviating from the 100% Documents, especially concerning changes that could result in ground-disturbing activities in locations other than those specified in the 100% Documents. When planned/anticipated change(s) to the 100% Documents arise, notification of such will be communicated in writing (email or letter) by a designated PG&E representative to Tribal representatives, who will determine if, from their perspective, the change(s) is (are) significant. If the change(s) is (are) deemed significant, a timely consultation between PG&E and the Tribal Representative(s) will occur. PG&E will evaluate the results of the consultation, and render a decision, which will be recorded and communicated to Agencies, Tribes and Stakeholders, and entered into the Agency records. If the Tribes disagree with the decision, they will communicate for the record their objections to PG&E and the Agencies.	1a-8, as well as additional protocols under communication-related mitigation measures in the EIR as well as under federal communication-related measures. Many existing documents including the CIMP, the PA, the CHPMP, the C/RAWP, the MOUs with Tribes, and the 2006 Settlement Agreement with the FMIT, contain requirements or protocols for consultation and/or communication with Tribes in various phases of the project, including during construction, operations and maintenance, and decommissioning. PG&E does not believe that an additional or new document on interaction/communication with the Tribes is necessary. PG&E defers to DOI/BLM on parts of this comment related to Tribal consultation. Regarding review of the final (100%) design mentioned in the 3rd paragraph of the comment, PG&E understands that there will not be a follow-up review and comment period of the final design (see RTC #7 DTSC-3). Please see RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/TRC for responses related to progress reports and data collected during construction, startup, and O&M.		the Tribes in revising the CHPMP in the future as well.		
57	Hualapai/TRC	Choose an item.	SOPs		Overall Comment	At present, there appears to be little or no explicit future role for the Tribes when it comes to review of significant (to the Tribes) changes that may occur during the bid-, construction-, start-up-,	See above	See above	See above		A similar RTC (RTC #58) was discussed

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PG&E Topock Compressor Station, Needles, California

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						or operations & maintenance periods of the project. This should be remedied with a standard operating procedure, protocol or some other suitable document that contains appropriate and acceptable language to remedy this situation. The following elements should be included. Tribal consultation will be conducted beginning after finalization and Agency approval of the 100% Topock Groundwater Remediation Project Basis of Design (BOD) Report, Construction/Remedial Action Work Plan (C/RWAP), and construction plans & specifications, referred to herein as the 100% Documents, and continue to be in effect and applicable to all remedy activities, including operations and maintenance activities, through completion of remedy decommissioning. Prior to the approval of the 100% Documents, there has been an opportunity for Tribal Representatives to review the remedial design documents and provide input in the form of review comments. Tribal participation and consultation during the development of these documents was crucial in ensuring that adverse effects on cultural, archaeological, and historical resources were either avoided or minimized to the extent practicable. This level of Tribal participation during the preparation of the 100% Documents has reduced the level of cultural impacts associated with the implementation of the groundwater remedy during the planned construction and operation & maintenance (O&M) periods. Continuation of that participation at a similar level is essential. Additionally, the Tribes should have an agreed-upon role and level of involvement in the review of data collected during remedy construction and O&M, after Agency approval of the 100% Documents, because that information may be relevant to changes to the remedy implementation or to remedy O&M that may be made going forward from the time of that Agency approval. It is expected that, during remedy well installation and testing, after system start-up, and during remedy operation, data will be collected and analyzed to evaluate whether the groundwater flow, geochemical, and solute transport models do not differ significantly from the conceptual site model with respect to the hydrogeologic characterization or remedy performance. If there are significant differences, the groundwater flow model, geochemical model, and/or the solute transport model will be updated and recalibrated. In addition data will be collected from monitoring and injection wells to establish baseline conditions and to provide insight into whether and why future modifications to the remedy or to its O&M will be required to optimize the remedy performance. The Tribes will be on a footing equivalent to other stakeholders regarding communications concerning the review of data collected during construction of the groundwater remedy well network, model updates and monthly progress reporting. This communication will help further reduce cultural impacts associated with the implementation of the final groundwater remedial design. In addition, consultation with the Tribes will be held prior to deviating from the 100% Documents, especially concerning changes that could result in ground-disturbing activities in locations other than those specified in the 100% Documents. When planned/anticipated change(s) to the 100% Documents arise, notification of such will be communicated in writing (email or letter) by a designated PG&E representative to Tribal representatives, who will determine if, from their perspective, the change(s) is (are) significant. If the change(s) is (are) deemed significant, a timely consultation between PG&E and the Tribal Representative(s) will occur. PG&E will evaluate the results of the consultation, and render a decision, which will be recorded and communicated to Agencies, Tribes and Stakeholders, and entered into the Agency records. If the Tribes disagree with the decision, they will communicate for the record their objections to PG&E and the Agencies.					at the August 18 TWG meeting.
58	Cocopah/TRC	Choose an item.	SOPs		Overall Comment	At present, there appears to be little or no explicit future role for the Tribes when it comes to review of significant (to the Tribes) changes that may occur during the bid-, construction-, start-up-, or operations & maintenance periods of the project. This should be remedied with a standard operating procedure, protocol or some other suitable document that contains appropriate and acceptable language to remedy this situation. The following elements should be included. Tribal consultation will be conducted beginning after finalization and Agency approval of the 100% Topock Groundwater Remediation Project Basis of Design (BOD) Report, Construction/Remedial Action Work Plan (C/RWAP), and construction plans & specifications, referred to herein as the 100% Documents, and continue to be in effect and applicable to all remedy activities, including operations and maintenance activities, through completion of remedy decommissioning.	See above	See above	See above		This RTC was discussed at the August 18 TWG meeting.

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
						Prior to the approval of the 100% Documents, there has been an opportunity for Tribal Representatives to review the remedial design documents and provide input in the form of review comments. Tribal participation and consultation during the development of these documents was crucial in ensuring that adverse effects on cultural, archaeological, and historical resources were either avoided or minimized to the extent practicable. This level of Tribal participation during the preparation of the 100% Documents has reduced the level of cultural impacts associated with the implementation of the groundwater remedy during the planned construction and operation & maintenance (O&M) periods. Continuation of that participation at a similar level is essential. Additionally, the Tribes should have an agreed-upon role and level of involvement in the review of data collected during remedy construction and O&M, after Agency approval of the 100% Documents, because that information may be relevant to changes to the remedy implementation or to remedy O&M that may be made going forward from the time of that Agency approval. It is expected that, during remedy well installation and testing, after system start-up, and during remedy operation, data will be collected and analyzed to evaluate whether the groundwater flow, geochemical, and solute transport models do not differ significantly from the conceptual site model with respect to the hydrogeologic characterization or remedy performance. If there are significant differences, the groundwater flow model, geochemical model, and/or the solute transport model will be updated and recalibrated. In addition data will be collected from monitoring and injection wells to establish baseline conditions and to provide insight into whether and why future modifications to the remedy or to its O&M will be required to optimize the remedy performance. The Tribes will be on a footing equivalent to other stakeholders regarding communications concerning the review of data collected during construction of the groundwater remedy well network, model updates and monthly progress reporting. This communication will help further reduce cultural impacts associated with the implementation of the final groundwater remedial design. In addition, consultation with the Tribes will be held prior to deviating from the 100% Documents, especially concerning changes that could result in ground-disturbing activities in locations other than those specified in the 100% Documents. When planned/anticipated change(s) to the 100% Documents arise, notification of such will be communicated in writing (email or letter) by a designated PG&E representative to Tribal representatives, who will determine if, from their perspective, the change(s) is (are) significant. If the change(s) is (are) deemed significant, a timely consultation between PG&E and the Tribal Representative(s) will occur. PG&E will evaluate the results of the consultation, and render a decision, which will be recorded and communicated to Agencies, Tribes and Stakeholders, and entered into the Agency records. If the Tribes disagree with the decision, they will communicate for the record their objections to PG&E and the Agencies.					
59	Chemehuevi/ TRC	Choose an item.	SOPs		Overall Comment	At present, there appears to be little or no explicit future role for the Tribes when it comes to review of significant (to the Tribes) changes that may occur during the bid-, construction-, start-up-, or operations & maintenance periods of the project. This should be remedied with a standard operating procedure, protocol or some other suitable document that contains appropriate and acceptable language to remedy this situation. The following elements should be included. Tribal consultation will be conducted beginning after finalization and Agency approval of the 100% Topock Groundwater Remediation Project Basis of Design (BOD) Report, Construction/Remedial Action Work Plan (C/RWAP), and construction plans & specifications, referred to herein as the 100% Documents, and continue to be in effect and applicable to all remedy activities, including operations and maintenance activities, through completion of remedy decommissioning. Prior to the approval of the 100% Documents, there has been an opportunity for Tribal Representatives to review the remedial design documents and provide input in the form of review comments. Tribal participation and consultation during the development of these documents was crucial in ensuring that adverse effects on cultural, archaeological, and historical resources were either avoided or minimized to the extent practicable. This level of Tribal participation during the preparation of the 100% Documents has reduced the level of cultural impacts associated with the implementation of the groundwater remedy during the planned construction and operation & maintenance (O&M) periods. Continuation of that participation at a similar level is essential.	See above	See above	See above		A similar RTC (RTC #58) was discussed at the August 18 TWG meeting.

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						Additionally, the Tribes should have an agreed-upon role and level of involvement in the review of data collected during remedy construction and O&M, after Agency approval of the 100% Documents, because that information may be relevant to changes to the remedy implementation or to remedy O&M that may be made going forward from the time of that Agency approval. It is expected that, during remedy well installation and testing, after system start-up, and during remedy operation, data will be collected and analyzed to evaluate whether the groundwater flow, geochemical, and solute transport models do not differ significantly from the conceptual site model with respect to the hydrogeologic characterization or remedy performance. If there are significant differences, the groundwater flow model, geochemical model, and/or the solute transport model will be updated and recalibrated. In addition data will be collected from monitoring and injection wells to establish baseline conditions and to provide insight into whether and why future modifications to the remedy or to its O&M will be required to optimize the remedy performance. The Tribes will be on a footing equivalent to other stakeholders regarding communications concerning the review of data collected during construction of the groundwater remedy well network, model updates and monthly progress reporting. This communication will help further reduce cultural impacts associated with the implementation of the final groundwater remedial design. In addition, consultation with the Tribes will be held prior to deviating from the 100% Documents, especially concerning changes that could result in ground-disturbing activities in locations other than those specified in the 100% Documents. When planned/anticipated change(s) to the 100% Documents arise, notification of such will be communicated in writing (email or letter) by a designated PG&E representative to Tribal representatives, who will determine if, from their perspective, the change(s) is (are) significant. If the change(s) is (are) deemed significant, a timely consultation between PG&E and the Tribal Representative(s) will occur. PG&E will evaluate the results of the consultation, and render a decision, which will be recorded and communicated to Agencies, Tribes and Stakeholders, and entered into the Agency records. If the Tribes disagree with the decision, they will communicate for the record their objections to PG&E and the Agencies.					
60	FMIT/TRC	Design	Infrastructures		Overall Comment	Dimensioning in the 90% engineering drawings, appears to result in trench excavation widths or depths in excess of required minimums. Final drawing dimensioning should be consistent across drawings, and minimize excavation widths and depths to the greatest extent possible. Any unnecessary over-excavation will be compounded over 5 miles of piping infrastructure. Therefore, final plan dimensions should be consistent with, but not in excess of, minimum requirements.	See RTC #21 FMIT-7.			Noted.	A similar RTC (RTC #21) was discussed at the July 23 TWG meeting.
61	Hualapai/TRC	Design	Infrastructures		Overall Comment	Dimensioning in the 90% engineering drawings, appears to result in trench excavation widths or depths in excess of required minimums. Final drawing dimensioning should be consistent across drawings, and minimize excavation widths and depths to the greatest extent possible. Any unnecessary over-excavation will be compounded over 5 miles of piping infrastructure. Therefore, final plan dimensions should be consistent with, but not in excess of, minimum requirements.	See above				A similar RTC (RTC #21) was discussed at the July 23 TWG meeting.
62	Cocopah/TRC	Design	Infrastructures		Overall Comment	Dimensioning in the 90% engineering drawings, appears to result in trench excavation widths or depths in excess of required minimums. Final drawing dimensioning should be consistent across drawings, and minimize excavation widths and depths to the greatest extent possible. Any unnecessary over-excavation will be compounded over 5 miles of piping infrastructure. Therefore, final plan dimensions should be consistent with, but not in excess of, minimum requirements.	See above				A similar RTC (RTC #21) was discussed at the July 23 TWG meeting.
63	Chemehuevi/ TRC	Design	Infrastructures		Overall Comment	Dimensioning in the 90% engineering drawings, appears to result in trench excavation widths or depths in excess of required minimums. Final drawing dimensioning should be consistent across drawings, and minimize excavation widths and depths to the greatest extent possible. Any unnecessary over-excavation will be compounded over 5 miles of piping infrastructure. Therefore, final plan dimensions should be consistent with, but not in excess of, minimum requirements.	See above				A similar RTC (RTC #21) was discussed at the July 23 TWG meeting.
64	FMIT/TRC	Non-design	Infrastructures			Currently PG&E has been directed by DOI/DTSC to remove the infrastructure for the remedy "to the extent practicable". There should be greater, and specific clarity to what this means to ensure that nearly ALL the buried infrastructure is actually removed. These should include an anticipated plan by PG&E regarding what elements of the remedy might not be "practicable" to remove, and assurances to remove all but the absolute minimum of the buried elements for this remedy. Tribal consultation be part of the process in deciding what is "practicable" to be removed at the time of decommissioning of this remedy.	Please see RTCs #12 DTSC-8 and #16 FMIT-2.		See RTC #16 FMIT-2.	Despite the RTC discussions, the Tribes remain with nearly complete uncertainty as to whether and when any underground piping will be removed as part of remedy	See RTCs #8 DTSC-4, #12 DTSC-8, and #16 FMIT-2.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
										decommissioning. Therefore, this comment remains unresolved. See also RTC 16 FMIT-2.	
65	Hualapai/TRC	Non-design	Infrastructures			Currently PG&E has been directed by DOI/DTSC to remove the infrastructure for the remedy "to the extent practicable". There should be greater, and specific clarity to what this means to ensure that nearly ALL the buried infrastructure is actually removed. These should include an anticipated plan by PG&E regarding what elements of the remedy might not be "practicable" to remove, and assurances to remove all but the absolute minimum of the buried elements for this remedy. Tribal consultation be part of the process in deciding what is "practicable" to be removed at the time of decommissioning of this remedy.	See above		See RTC #16 FMIT-2.		See RTCs #8 DTSC-4, #12 DTSC-8, and #16 FMIT-2.
66	Cocopah/TRC	Non-design	Infrastructures			Currently PG&E has been directed by DOI/DTSC to remove the infrastructure for the remedy "to the extent practicable". There should be greater, and specific clarity to what this means to ensure that nearly ALL the buried infrastructure is actually removed. These should include an anticipated plan by PG&E regarding what elements of the remedy might not be "practicable" to remove, and assurances to remove all but the absolute minimum of the buried elements for this remedy. Tribal consultation be part of the process in deciding what is "practicable" to be removed at the time of decommissioning of this remedy.	See above		See RTC #16 FMIT-2.	Despite the RTC discussions, the Tribes remain with nearly complete uncertainty as to whether and when any underground piping will be removed as part of remedy decommissioning. Therefore, this comment remains unresolved.	See RTCs #8 DTSC-4, #12 DTSC-8, and #16 FMIT-2.
67	Chemehuevi/ TRC	Non-design	Infrastructures			Currently PG&E has been directed by DOI/DTSC to remove the infrastructure for the remedy "to the extent practicable". There should be greater, and specific clarity to what this means to ensure that nearly ALL the buried infrastructure is actually removed. These should include an anticipated plan by PG&E regarding what elements of the remedy might not be "practicable" to remove, and assurances to remove all but the absolute minimum of the buried elements for this remedy. Tribal consultation be part of the process in deciding what is "practicable" to be removed at the time of decommissioning of this remedy.	See above		See RTC #16 FMIT-2.	Despite the RTC discussions, the Tribes remain with nearly complete uncertainty as to whether and when any underground piping will be removed as part of remedy decommissioning. Therefore, this comment remains unresolved. It may be helpful to formally detail any possible reasoning for not decommissioning infrastructure.	See RTCs #8 DTSC-4, #12 DTSC-8, and #16 FMIT-2.
68	FMIT/TRC	Non-design	Infrastructures		Overall Comment	Locations or points which need to be monitored, but do not require significant equipment, should be classified as "Access by Foot Traffic Only." One factor in limiting impacts would include encouraging limitations on vehicular traffic where possible. PG&E should work with Tribes to determine which access routes would be eligible for this designation. Given the decades long time frame for this project, and the long timeframe for the desert landscape to recover, any repeated impacts by vehicular access will be compounded over decades. It's important to minimize the impacts of accesses needed to conduct this remedy. Therefore, published examples of other areas where precautions have been taken to preserve cultural resources should be considered.	See RTC #20 FMIT-6.	See RTC #20 FMIT-6.		TBD.	DTSC Response: See RTC 20
69	Hualapai/TRC	Non-design	Infrastructures		Overall Comment	Locations or points which need to be monitored, but do not require significant equipment, should be classified as "Access by Foot Traffic Only." One factor in limiting impacts would include encouraging limitations on vehicular traffic where possible. PG&E should work with Tribes to determine which access routes would be eligible for this designation. Given the decades long time frame for this project, and the long timeframe for the desert landscape to recover, any repeated impacts by vehicular access will be compounded over decades. It's important to minimize the impacts of accesses needed to conduct this remedy. Therefore, published examples of other areas where precautions have been taken to preserve cultural resources should be considered.	"Access by foot traffic only" routes would require installation of additional infrastructure to facilitate safe sampling and O&M over the long term. For example, "access by foot traffic only" sample collection methods at monitoring wells would require the installation	DTSC disagrees with the Tribes proposal to conduct monitoring and maintenance by foot traffic only. Not only is this proposed method of access inefficient due to necessity of carrying equipment, this practice can be		Comments noted. However this issue is considered unresolved. As this project moves forward, minimization of impacts from vehicular traffic to service and/or monitor wells or equipment should be also be a priority.	DTSC Response: While Agencies will not limit PG&E to access by foot traffic only we agree that work should be conducted in a manner that minimizes impacts from vehicular traffic.

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							of additional pipes and conduits (not currently included in the design) for management of purge water, so that it could be collected without requiring a person to carry purge water over a long distance. Without such infrastructure, there is a health and safety concern for workers who have to carry the purge water, especially during the summer months when carrying a heavy load of water in the heat can be dangerous. Currently all monitoring wells have established vehicle access routes. All additional monitoring wells installed with the remedy will also have access routes established as a result of construction. PG&E plans to continue to use these access routes with existing monitoring equipment because it will not add any additional disturbance and will avoid the need for additional disturbance which would be caused by adding sample collection infrastructure (pipes and conduits) that would be required if sample collection was accomplished by "foot traffic only" methods.	seriously dangerous to workers during warm weather days. Foot traffic only also reduces the ability for expeditious egress in the event of emergencies. Although DTSC is committed to minimizing disturbance into areas that Tribes considers sacred, health and safety of potential workers must also be considered.			
70	Cocopah/TRC	Non-design	Infrastructures		Overall Comment	Locations or points which need to be monitored, but do not require significant equipment, should be classified as "Access by Foot Traffic Only." One factor in limiting impacts would include encouraging limitations on vehicular traffic where possible. PG&E should work with Tribes to determine which access routes would be eligible for this designation. Given the decades long time frame for this project, and the long timeframe for the desert landscape to recover, any repeated impacts by vehicular access will be compounded over decades. It's important to minimize the impacts of accesses needed to conduct this remedy. Therefore, published examples of other areas where precautions have been taken to preserve cultural resources should be considered.	See RTC #69 Hualapai/ TRC.			Comments noted. However this issue is considered unresolved. As this project moves forward, minimization of impacts from vehicular traffic to service and/or monitor wells or equipment should be a priority.	DTSC Response: See response to RTC #69.
71	Chemehuevi/ TRC	Non-design	Infrastructures		Overall Comment	Locations or points which need to be monitored, but do not require significant equipment, should be classified as "Access by Foot Traffic Only." One factor in limiting impacts would include encouraging limitations on vehicular traffic where possible. PG&E should work with Tribes to determine which access routes would be eligible for this designation. Given the decades long time frame for this project, and the long timeframe for the desert landscape to recover, any repeated	See RTC #69 Hualapai/ TRC.			Comments noted. However this issue is considered unresolved. As this project moves forward, minimization	DTSC Response: See response to RTC #69.

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						impacts by vehicular access will be compounded over decades. It's important to minimize the impacts of accesses needed to conduct this remedy. Therefore, published examples of other areas where precautions have been taken to preserve cultural resources should be considered.				of impacts from vehicular traffic to service and/or monitor wells or equipment should be a priority.	
72	FMIT/TRC	Choose an item.	Choose an item.		Overall Comment	Large amounts of NEW geologic and hydrogeologic data will be generated during drilling, installation and testing of the various elements of the remediation system. These data should be part of an ongoing evaluation for the usefulness of the design elements. The amount of geologic and hydrogeologic data that will be generated during the installation of the system amounts to a very significant portion of ALL geologic data known for the Topock site. The data generated during the installation need to be part of an ongoing evaluation of the design. If unexpected geologic conditions are encountered and there is no flexibility in the design, this could result in wells and construction elements being installed "as planned" that may ultimately not generate any benefit. Significant effort has been made on the part of all parties to minimize such disturbances/number of wells. This effort should continue even as construction of the remedy proceeds.	PG&E is aligned with the Tribes on the goal of minimizing disturbance, overall project footprint, and number of wells. Specifically, PG&E's goal is to avoid unnecessary disturbance and constructing unnecessary infrastructure. To that end, as discussed in RTC #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC, to minimize the potential for uncertainties in the conceptual site model to cause unnecessary disturbance (that is, to avoid constructing unnecessary infrastructure), PG&E had proposed measures such as scheduling data collection at planned Category 1 well locations early in the construction schedule (see Section 3.2.1.3 of C/RAWP) and combining the collection of geotechnical data with the upcoming soil investigation. To this end, PG&E submitted a more detailed construction and start-up sequence in anticipation of construction activity in 2016, during the 90% RTC period (see **Attachment D** of the final RTC table). This sequencing plan provides for start-up of system elements while construction proceeds. This approach will provide more time for data analysis and adaptive design changes while still completing the overall program within the originally			Comments noted. However this issue is considered unresolved. As this project moves forward, minimization of impacts from vehicular traffic to service and/or monitor wells or equipment should be a priority. In addition, responses to the numerous comments regarding groundwater modeling and its application to this remediation as well as the white paper by Prucha and Eggers contain detailed suggestions regarding methods to improve the usefulness and reliability of the model output. Finally, it should always be kept in mind that the Tribe favors early removal of the IM3 facility.	DTSC Response: Tribal comment noted.

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							planned schedule. Specifically the sequencing will allow time to assess and accommodate, as appropriate, changes to the remedial system footprint; including the number and location of the Uplands IW, MWs and the associated pipeline alignment, and the Riverbank wells, in coordination with tribal stakeholders and agencies. PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.				
73	Hualapai/TRC	Choose an item.	Choose an item.		Overall Comment	Large amounts of NEW geologic and hydrogeologic data will be generated during drilling, installation and testing of the various elements of the remediation system. These data should be part of an ongoing evaluation for the usefulness of the design elements. The amount of geologic and hydrogeologic data that will be generated during the installation of the system amounts to a very significant portion of ALL geologic data known for the Topock site. The data generated during the installation need to be part of an ongoing evaluation of the design. If unexpected geologic conditions are encountered and there is no flexibility in the design, this could result in wells and construction elements being installed "as planned" that may ultimately not generate any benefit. Significant effort has been made on the part of all parties to minimize such disturbances/number of wells. This effort should continue even as construction of the remedy proceeds.	See above			Comments noted. However this issue is considered unresolved. As this project moves forward, minimization of impacts from vehicular traffic to service and/or monitor wells or equipment should be a priority. In addition, responses to the numerous comments regarding groundwater modeling and its application to this remediation as well as the technical memo by Prucha and Eggers contain detailed suggestions regarding improvements to improve the usefulness and reliability of the model output.	DTSC Response: Tribal comment noted.
74	Cocopah/TRC	Choose an item.	Choose an item.		Overall Comment	Large amounts of NEW geologic and hydrogeologic data will be generated during drilling, installation and testing of the various elements of the remediation system. These data should be part of an ongoing evaluation for the usefulness of the design elements. The amount of geologic and hydrogeologic data that will be generated during the installation of the system amounts to a very significant portion of ALL geologic data known for the Topock site. The data generated during the installation need to be part of an ongoing evaluation of the design. If unexpected geologic conditions are encountered and there is no flexibility in the design, this could	See above			Comments noted. However this issue is considered unresolved. As this project moves forward, minimization of impacts from vehicular traffic to	This RTC was discussed at the August 27 TWG meeting. DTSC Response: Tribal comment

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						result in wells and construction elements being installed "as planned" that may ultimately not generate any benefit. Significant effort has been made on the part of all parties to minimize such disturbances/number of wells. This effort should continue even as construction of the remedy proceeds.				service and/or monitor wells or equipment should be a priority. In addition, responses to the numerous comments regarding groundwater modeling and its application to this remediation as well as the technical memo by Prucha and Eggers contain detailed suggestions regarding improvements to improve the usefulness and reliability of the model output.	noted.
75	Chemehuevi/ TRC	Choose an item.	Choose an item.		Overall Comment	Large amounts of NEW geologic and hydrogeologic data will be generated during drilling, installation and testing of the various elements of the remediation system. These data should be part of an ongoing evaluation for the usefulness of the design elements. The amount of geologic and hydrogeologic data that will be generated during the installation of the system amounts to a very significant portion of ALL geologic data known for the Topock site. The data generated during the installation need to be part of an ongoing evaluation of the design. If unexpected geologic conditions are encountered and there is no flexibility in the design, this could result in wells and construction elements being installed "as planned" that may ultimately not generate any benefit. Significant effort has been made on the part of all parties to minimize such disturbances/number of wells. This effort should continue even as construction of the remedy proceeds.	See above			Comments noted. However this issue is considered unresolved. As this project moves forward, minimization of impacts from vehicular traffic to service and/or monitor wells or equipment should be a priority. In addition, responses to the numerous comments regarding groundwater modeling and its application to this remediation as well as the technical memo by Prucha and Eggers contain detailed suggestions regarding improvements to improve the usefulness and reliability of the model output.	DTSC Response: Tribal comment noted.
76	FMIT/TRC	Non-design	GW Modeling		Overarching Comment	Modeling tools (microFEM, modflow and MT3D) have been critical to the development of both the proposed remedial system design and operations. Once the system is operating, observed water levels, hydraulic gradients and concentration trends will be compared to simulated values to make critical decisions (decision monitoring frameworks/tables) regarding changes to the currently proposed system design (i.e., new wells) and operation. These models have the ability to incorporate the best available information on the 3-dimensional aquifer geometry, heterogeneous hydraulic property distributions and complex array and timing of the proposed multi-layer injections and extractions. As such, they represent the best available tools for demonstrating to all stakeholders that the remedial system design and operation at any point in time continues to meet RAOs, and that any proposals to change the currently proposed design and operation will do so as well. Despite the clear importance and continued need for these modeling tools, especially during startup and early operations when adjustments to the design and operation will be most frequent, several issues have been identified. These issues are of considerable concern to Tribes because of the potential for poorly thought-out or 'urgent crisis' decisions which lead to increased number of wells/disturbance or unnecessarily impacting sensitive cultural areas. Key issues include: 1) Triggers (i.e., "significant differences") for updating/use of the models are still vague/non-committal as noted comment to the 60% BOD and highlighted in the Prucha, April 3, 2014 summary memo to the Tribes. 2) Details on approach/methodology for updating, re-calibrating, re-optimizing and re-running	The groundwater flow and transport model will be updated during the remedy installation, start-up, and operation phases in an effort to refine the predictive performance of the model. While the model will remain an important tool to predict long term changes, the system performance will be demonstrated and measured with site specific empirical data. 1. Rather than defining specific criteria to trigger model updates, the term "significant differences"			Using site-specific empirical data can certainly be useful in evaluating the CURRENT system performance, but when considering changes to the design and operation of the remedial system, we believe the model will be essential for correctly guiding a) how much to adjust some knob, b) which direction to adjust the knob, c) which knob(s) to adjust. Probably more importantly, we continue to strongly feel that the model	A similar RTC (RTC #78) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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						long-term remedial system operations remains vague and limited. Any re-calibration or modification to operations (i.e., rates, TOC dosing) or design (i.e., new wells) should require full re-evaluation of whether the modified system continues to meet RAOs, especially long-term remedial cleanup times. 3) Critical decisions on assessments and potential changes to the operation and design will be made based on various O&M Monitoring Decision Framework diagrams. But detailed narrative on updates to and use of the models is vague and limited.	will be removed from the text and model updates will be conducted according to the timetable described in Section 12 of Appendix B. Due to the large amount of data that will be collected during the various remedy phases, model updates will be beneficial independent of specific “significant difference” thresholds. 2. Additional details will be provided with respect to the approach/ methodology for updating, re-calibrating, re-optimizing, and re-running the model. During each defined model update the following steps will be included: a) the 3D structure of the model will be refined based on new vertical characterization of the alluvial aquifer/bedrock contact. b) hydraulic property distributions will be refined based on updates to the spatial distribution of aquifer test data. c) Actual operational data will be integrated into the groundwater flow model (i.e. pumping rates, pumping schedule, and vertical flow distribution) d) the groundwater flow model will be recalibrated to average observed water levels during each model update interval. e) geochemical modeling parameters will be refined based on observed water quality data and field parameters. f) solute transport modeling parameters will be refined based on			represents the ONLY tool (not empirical site data) that will permit evaluating whether the planned OR modified remedial system design and operation still meet all RAOs, especially over the long term (i.e., decades out). There is no way that empirical site data alone will be sufficient to confirm attainment of long-term RAOs, or long-term performance of the system. The risk to updating on an annual basis rather than for example, after specific sets of data are collected, significantly reduces the potential to learn about actual flow conditions within the natural hydrogeologic environment and how they will change. This in turn limits the ability to 'adaptively manage' the design and operation of the system. We recommend updating/ re-calibrating the model more frequently and immediately after sets of key wells are installed and tested. The model certainly doesn't have to 'drive' all decisions related to design modifications or operational changes BUT stakeholders need to get guarantees that the model will be updated, re-calibrated and future scenarios regenerated whenever new designs/operations are made primarily to ensure for stakeholders that all RAOs are being met, especially the long-term ones that cannot be assessed using “empirical” field data. ONLY the model	

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							observed water quality data and field parameters as well as geochemical modeling. g) actual remedy operation parameters will be integrated into the solute transport model (i.e. TOC concentration, TOC injection frequency, etc). h) solute transport model will be calibrated against observed movement of Cr(VI), Mn, and As during previous time interval. i) After model calibration, predictive modeling runs will be conducted to evaluate the simulated remedy performance in the future. j) Potential design updates and operations will be considered to further optimize remedy operation (i.e. pumping rates, TOC dosing concentration, dosing and operational frequency) j) Assessment of hydraulic capture zones based on simulated capture delineation and hydraulic gradients. The model will be used to predict future performance and assess the need for infrastructure changes in conjunction with empirical data. The model will not be used for all changes associated with system operation where current empirical data is a more accurate reflection of system performance and the need for operational changes; such as flow rate changes, TOC feed adjustments, and maintenance needs. 3. Text describing the use of models during the remedy installation,			can estimate the changed response in the future - i.e., cleanup times. But to do this, the model must be maintained (i.e., updated, calibrated and long-term future scenarios re-simulated). ALL stresses, and changes to stresses need to be monitored/measured to successfully re-calibrate the model. This will become a serious challenge to do correctly/adequately - and details of how updates and re-calibrations will be performed should be clearly defined for all stakeholders.	

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							start-up, and operation will be integrated into the model report.				
77	Hualapai/TRC	Non-design	GW Modeling		Overarching Comment	Modeling tools (microFEM, modflow and MT3D) have been critical to the development of both the proposed remedial system design and operations. Once the system is operating, observed water levels, hydraulic gradients and concentration trends will be compared to simulated values to make critical decisions (decision monitoring frameworks/tables) regarding changes to the currently proposed system design (i.e., new wells) and operation. These models have the ability to incorporate the best available information on the 3-dimensional aquifer geometry, heterogeneous hydraulic property distributions and complex array and timing of the proposed multi-layer injections and extractions. As such, they represent the best available tools for demonstrating to all stakeholders that the remedial system design and operation at any point in time continues to meet RAOs, and that any proposals to change the currently proposed design and operation will do so as well. Despite the clear importance and continued need for these modeling tools, especially during startup and early operations when adjustments to the design and operation will be most frequent, several issues have been identified. These issues are of considerable concern to Tribes because of the potential for poorly thought-out or 'urgent crisis' decisions which lead to increased number of wells/disturbance or unnecessarily impacting sensitive cultural areas. Key issues include: 1) Triggers (i.e., "significant differences") for updating/use of the models are still vague/non-committal as noted comment to the 60% BOD and highlighted in the Prucha, April 3, 2014 summary memo to the Tribes. 2) Details on approach/methodology for updating, re-calibrating, re-optimizing and re-running long-term remedial system operations remains vague and limited. Any re-calibration or modification to operations (i.e., rates, TOC dosing) or design (i.e., new wells) should require full re-evaluation of whether the modified system continues to meet RAOs, especially long-term remedial cleanup times. 3) Critical decisions on assessments and potential changes to the operation and design will be made based on various O&M Monitoring Decision Framework diagrams. But detailed narrative on updates to and use of the models is vague and limited.	See above			Using site specific empirical data can certainly be useful in evaluating the CURRENT system performance, but when considering changes to the design and operation of the remedial system, we believe the model will be essential for correctly guiding a) how much to adjust some knob, b) which direction to adjust the knob, c) which knob(s) to adjust. Probably more importantly, we continue to strongly feel that the model represents the ONLY tool (not empirical site data) that will permit evaluating whether the planned OR adjusted/ modified remedial system design and operation still meet all RAOs, especially over the long term (i.e., decades out). There is no way that empirical site data by itself will be able to confirm meeting long-term RAOs, or long-term performance of the system. The risk to updating on an annual basis rather than for example, after specific sets of data are collected, significantly reduces the potential to learn about actual flow conditions within the natural hydrogeologic environment and how they will change. This in turn limits the ability to 'adaptively manage' the design and operation of the system. We recommend updating/re-calibrating	A similar RTC (RTC #78) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										the model more frequently and immediately after sets of key wells are installed and tested. The model certainly doesn't have to 'drive' all decisions related to design modifications or operational changes BUT stakeholders need to get guarantees that the model will be updated, re-calibrated and future scenarios regenerated whenever new designs/operations are made primarily to ensure for stakeholders that all RAOs are being met, especially the long-term ones that can't be assessed using 'empirical' field data. ONLY the model can estimate the changed response in the future - i.e., cleaup times. But to do this, the model must be maintained (ie updated, calibrated and long-term future scenarios resimulated). ALL stresses, and changes to stresses need to be monitored/measured to successfully re-calibrate the model. This will become a serious challenge to do correctly/adequately - and details of how updates and re-calibrations will be performed should be clearly defined for all stakeholders.	
78	Cocopah/TRC	Non-design	GW Modeling		Overarching Comment	Modeling tools (microFEM, modflow and MT3D) have been critical to the development of both the proposed remedial system design and operations. Once the system is operating, observed water levels, hydraulic gradients and concentration trends will be compared to simulated values to make critical decisions (decision monitoring frameworks/tables) regarding changes to the currently proposed system design (i.e., new wells) and operation. These models have the ability to incorporate the best available information on the 3-dimensional aquifer geometry, heterogeneous hydraulic property distributions and complex array and timing of the proposed multi-layer injections and extractions. As such, they represent the best available tools for demonstrating to all stakeholders that the remedial system design and operation at any point in time continues to meet RAOs, and that any proposals to change the currently proposed design and operation will do so as well. Despite the clear importance and continued need for these modeling tools, especially during	See above			Using site specific empirical data can certainly be useful in evaluating the CURRENT system performance, but when considering changes to the design and operation of the remedial system, we believe the model will be essential for correctly guiding a)	This RTC was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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						startup and early operations when adjustments to the design and operation will be most frequent, several issues have been identified. These issues are of considerable concern to Tribes because of the potential for poorly thought-out or 'urgent crisis' decisions which lead to increased number of wells/disturbance or unnecessarily impacting sensitive cultural areas. Key issues include: 1) Triggers (i.e., "significant differences") for updating/use of the models are still vague/non-committal as noted comment to the 60% BOD and highlighted in the Prucha, April 3, 2014 summary memo to the Tribes. 2) Details on approach/methodology for updating, re-calibrating, re-optimizing and re-running long-term remedial system operations remains vague and limited. Any re-calibration or modification to operations (i.e., rates, TOC dosing) or design (i.e., new wells) should require full re-evaluation of whether the modified system continues to meet RAOs, especially long-term remedial cleanup times. 3) Critical decisions on assessments and potential changes to the operation and design will be made based on various O&M Monitoring Decision Framework diagrams. But detailed narrative on updates to and use of the models is vague and limited.				how much to adjust some knob, b) which direction to adjust the knob, c) which knob(s) to adjust. Probably more importantly, we continue to strongly feel that the model represents the ONLY tool (not empirical site data) that will permit evaluating whether the planned OR adjusted/ modified remedial system design and operation still meet all RAOs, especially over the long term (i.e., decades out). There is no way that empirical site data by itself will be able to confirm meeting long-term RAOs, or long-term performance of the system. The risk to updating on an annual basis rather than for example, after specific sets of data are collected, significantly reduces the potential to learn about actual flow conditions within the natural hydrogeologic environment and how they will change. This in turn limits the ability to 'adaptively manage' the design and operation of the system. We recommend updating/re-calibrating the model more frequently and immediately after sets of key wells are installed and tested. The model certainly doesn't have to 'drive' all decisions related to design modifications or operational changes BUT stakeholders need to get guarantees that the model will be updated, re-calibrated and future scenarios	

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										regenerated whenever new designs/operations are made primarily to ensure for stakeholders that all RAOs are being met, especially the long-term ones that can't be assessed using 'empirical' field data. ONLY the model can estimate the changed response in the future - i.e., cleaup times. But to do this, the model must be maintained (ie updated, calibrated and long-term future scenarios resimulated). ALL stresses, and changes to stresses need to be monitored/ measured to successfully re-calibrate the model. This will become a serious challenge to do correctly/adequately - and details of how updates and re-calibrations will be performed should be clearly defined for all stakeholders.	
79	Chemehuevi/ TRC	Non-design	GW Modeling		Overarching Comment	Modeling tools (microFEM, modflow and MT3D) have been critical to the development of both the proposed remedial system design and operations. Once the system is operating, observed water levels, hydraulic gradients and concentration trends will be compared to simulated values to make critical decisions (decision monitoring frameworks/tables) regarding changes to the currently proposed system design (i.e., new wells) and operation. These models have the ability to incorporate the best available information on the 3-dimensional aquifer geometry, heterogeneous hydraulic property distributions and complex array and timing of the proposed multi-layer injections and extractions. As such, they represent the best available tools for demonstrating to all stakeholders that the remedial system design and operation at any point in time continues to meet RAOs, and that any proposals to change the currently proposed design and operation will do so as well. Despite the clear importance and continued need for these modeling tools, especially during startup and early operations when adjustments to the design and operation will be most frequent, several issues have been identified. These issues are of considerable concern to Tribes because of the potential for poorly thought-out or 'urgent crisis' decisions which lead to increased number of wells/disturbance or unnecessarily impacting sensitive cultural areas. Key issues include: 1) Triggers (i.e., "significant differences") for updating/use of the models are still vague/non-committal as noted comment to the 60% BOD and highlighted in the Prucha, April 3, 2014 summary memo to the Tribes. 2) Details on approach/methodology for updating, re-calibrating, re-optimizing and re-running long-term remedial system operations remains vague and limited. Any re-calibration or modification to operations (i.e., rates, TOC dosing) or design (i.e., new wells) should require full re-evaluation of whether the modified system continues to meet RAOs, especially long-term remedial cleanup times. 3) Critical decisions on assessments and potential changes to the operation and design will be made based on various O&M Monitoring Decision Framework diagrams. But detailed narrative on updates to and use of the models is vague and limited.	See above			Using site specific empirical data can certainly be useful in evaluating the CURRENT system performance, but when considering changes to the design and operation of the remedial system, we believe the model will be essential for correctly guiding a) how much to adjust some knob, b) which direction to adjust the knob, c) which knob(s) to adjust. Probably more importantly, we continue to strongly feel that the model represents the ONLY tool (not empirical site data) that will permit evaluating whether the planned OR adjusted/ modified remedial system design and operation still meet all	A similar RTC (RTC #78) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										RAOs, especially over the long term (i.e., decades out). There is no way that empirical site data by itself will be able to confirm meeting long-term RAOs, or long-term performance of the system. The risk to updating on an annual basis rather than for example, after specific sets of data are collected, significantly reduces the potential to learn about actual flow conditions within the natural hydrogeologic environment and how they will change. This in turn limits the ability to 'adaptively manage' the design and operation of the system. We recommend updating/re-calibrating the model more frequently and immediately after sets of key wells are installed and tested. The model certainly doesn't have to 'drive' all decisions related to design modifications or operational changes BUT stakeholders need to get guarantees that the model will be updated, re-calibrated and future scenarios regenerated whenever new designs/operations are made primarily to ensure for stakeholders that all RAOs are being met, especially the long-term ones that can't be assessed using 'empirical' field data. ONLY the model can estimate the changed response in the future - i.e., cleaup times. But to do this, the model must be maintained (ie updated, calibrated and	

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										long-term future scenarios resimulated). ALL stresses, and changes to stresses need to be monitored/ measured to successfully re-calibrate the model. This will become a serious challenge to do correctly/adequately - and details of how updates and re-calibrations will be performed should be clearly defined for all stakeholders.	
Specific Comments – 90% BOD, Executive Summary											
80	FMIT-16	Non-design	Editorial	Executive Summary	Global ES	This ES represents a helpful compilation of information about the 90% BOD. The tabular summaries and provided figures are an excellent summary of information for the reviewers. It might have been nice to have the ES separate from the remainder of the voluminous document.	PG&E appreciates the Tribe's feedback and is glad that the tabular summaries and figures provided in the 90% BOD are useful to the Tribe in your review. It is customary that an executive summary be created for large documents to provide an overview of key contents in the document, and to refer the readers to subsequent chapters for additional details. Separation of the executive summary from the remainder of the document defeats the purpose of an executive summary and introduces yet another document to account for. Therefore, it is not recommended.		Comment noted.		
81	DOI-1	Non-design	Process	ES Introduction/ v	As shown, inputs from Interested Tribes and Stakeholders were solicited and received on the preliminary (30%) and intermediate (60%) Basis of Design Submittals (30% BOD [CH2M HILL	The text inappropriately identifies that comments were solicited only from "interested Tribes and Stakeholders". In accordance with the PA, comments were solicited from all nine federally recognized Tribes. Comments were received from a subset of those Tribes, specifically the Fort Mojave, Hualapai, Cocopah, and Chemehuevi Indian Tribes. Input was received from these Tribes and the Colorado River Indian Tribe throughout the design process. A notation/footnote should be inserted here to note that the term "interested Tribes" will be used to reference the aforementioned Tribes.	Text will be revised to state that comments were solicited from nine federally recognized Tribes, and comments were received throughout the design process from a subset of those Tribes, specifically the Fort Mojave, Hualapai, Cocopah, Chemehuevi, and Colorado River Indian Tribes. A footnote will be inserted to note that the term "Interested				Comment resolved pending DOI review of the final design documents.

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					2011l] and 60% BOD [CH2M HILL 2013k]) and are being solicited again at this 90% design stage.		Tribes" is used to reference the aforementioned Tribes plus the Fort Yuma-Quechan Tribe.				
82	FMIT/TRC 1s	Design	Process	ES.1 Overview	Surrounding project site includes land owned and/or managed by a number of government and private entities	At what point will the final decision on use of private lands be determined. In the case that private land owners do not grant permission for a remedial infrastructure as proposed within the 90% BOD, how will design changes be effected and how will tribes be involved.	PG&E is working diligently to secure all necessary access agreements for remedy implementation, consistent with the requirements in the Corrective Action Consent Agreement between PG&E and DTSC and the Remedial Design/Remedial Action Consent Decree between PG&E and the United States, on behalf of DOI. If a needed access agreement cannot be obtained, PG&E will inform the Agencies and propose solutions which may include design modifications.	Deviation from the approved design will be communicated to the Tribes. It is DTSC's expectations that PG&E will have all access agreements within 30 days of the approval of the C/RAWP in accordance with the 1996 CACA and design of outstanding infrastructures flushed out during the RTC process for DTSC's CEQA consideration prior to design approval.	DOI concurs with PG&E response.		A similar RTC (RTC #84) was discussed at the August 18 TWG meeting.
83	Hualapai/TRC 1s	Design	Process	ES.1 Overview	Surrounding project site includes land owned and/or managed by a number of government and private entities	At what point will the final decision on use of private lands be determined. In the case that private land owners do not grant permission for a remedial infrastructure as proposed within the 90% BOD, how will design changes be effected and how will tribes be involved.	See above	See above	See above	Hualapai reiterates the need to be included (along with DOI and DTSC) as a primary party in communications regarding all project design changes, or work variance requests including material deviations from the design documents and/or C/RAWP due to discovery of changed site conditions as discussed in these earlier comments (at left). Communicating these changes needs to occur as soon as it is known that a change needs to be made. Hualapai needs to be included in those discussions via informing a tribal monitor, or email or telephone calls to designated points of contact. Once the change has been approved then a formal	A similar RTC (RTC #84) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										document can be forwarded to Hualapai. Hualapai state their intended interest to stay involved with decisions addressing any deviations during implementation of the work plan with the same level of involvement that has occurred during the drafting of the work plan. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Hualapai and other interested tribes as well as to notify Tribes of the need for particular wells.	
84	Cocopah/TRC 1s	Design	Process	ES.1 Overview	Surrounding project site includes land owned and/or managed by a number of government and private entities	At what point will the final decision on use of private lands be determined. In the case that private land owners do not grant permission for a remedial infrastructure as proposed within the 90% BOD, how will design changes be effected and how will tribes be involved.	See above	See above	See above	The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape. The Tribes state their intended interest to stay involved with decisions addressing any deviations during implementation of the work plan with the same level of involvement that has	This RTC was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										occurred during the drafting of the work plan This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Tribes as well as to notify Tribes of the need for particular wells.	
85	Chemehuevi/ TRC 1s	Design	Process	ES.1 Overview	Surrounding project site includes land owned and/or managed by a number of government and private entities	At what point will the final decision on use of private lands be determined. In the case that private land owners do not grant permission for a remedial infrastructure as proposed within the 90% BOD, how will design changes be effected and how will tribes be involved.	See above	See above	See above	The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape. The Tribes state their intended interest to stay involved with decisions addressing any deviations during implementation of the work plan with the same level of involvement that has occurred during the drafting of the work plan This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and	A similar RTC (RTC #84) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										environmental resources identified by Tribes as well as to notify Tribes of the need for particular wells.	
86	FMIT/TRC 1l	Design	CEQA/EIR	ES.1 Overview	Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the Mitigation Monitoring and Reporting Program (MMRP; DTSC 2011a), adopted by DTSC in 2011 as part of the certified EIR (DTSC 2011b). In addition, mitigation measures have been and will continue to be implemented in accordance with the Programmatic Agreement (PA; BLM 2010); the Cultural and Historic Properties Management Plan (CHPMP; BLM 2012); the Cultural Impact Minimization Program (CIMP; PG&E 2014); and in consultation with the Tribes throughout the construction and startup process. The work will be conducted in a manner that recognizes and respects these resources and	The tribes would like for the report to indicate that consultation with the Tribes will continue through and beyond the startup process. Specifically the Tribes would like for any changes that are made post the construction and startup process that deviate from the design as dictated in the final 100% BOD to require Tribal consultation prior to implementation.	Please see RTCs #44 FMIT/TRC, #45 Hualapai/ TRC, #46 Cocopah/TRC, #47 Chemehuevi/TRC, #56 FMIT/TRC, #57 Hualapai/ TRC, #58 Cocopah/TRC, #59 Chemehuevi/TRC.			Please see response to comment FMIT/TRC RTC #44.	A similar RTC (RTC #88) was discussed at the August 18 TWG meeting. The Tribes and DOI/BLM will discuss which changes during construction invoke Tribal consultation.

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					the spiritual values of the area.						
87	Hualapai/TRC 1l	Design	CEQA/EIR	ES.1 Overview	Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the Mitigation Monitoring and Reporting Program (MMRP; DTSC 2011a), adopted by DTSC in 2011 as part of the certified EIR (DTSC 2011b). In addition, mitigation measures have been and will continue to be implemented in accordance with the Programmatic Agreement (PA; BLM 2010); the Cultural and Historic Properties Management Plan (CHPMP; BLM 2012); the Cultural Impact Minimization Program (CIMP; PG&E 2014); and in consultation with the Tribes throughout the construction and startup process. The work will be conducted in a manner that recognizes and respects these resources and the spiritual values of the area.	The tribes would like for the report to indicate that consultation with the Tribes will continue through and beyond the startup process. Specifically the Tribes would like for any changes that are made post the construction and startup process that deviate from the design as dictated in the final 100% BOD to require Tribal consultation prior to implementation.	See above			See response to comment Hualapai/ TRC RTC #83.	A similar RTC (RTC #88) was discussed at the August 18 TWG meeting. Tribes and DOI/BLM will discuss which changes during construction invoke Tribal consultation.

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88	Cocopah/TRC 1l	Design	CEQA/EIR	ES.1 Overview	Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the Mitigation Monitoring and Reporting Program (MMRP; DTSC 2011a), adopted by DTSC in 2011 as part of the certified EIR (DTSC 2011b). In addition, mitigation measures have been and will continue to be implemented in accordance with the Programmatic Agreement (PA; BLM 2010); the Cultural and Historic Properties Management Plan (CHPMP; BLM 2012); the Cultural Impact Minimization Program (CIMP; PG&E 2014); and in consultation with the Tribes throughout the construction and startup process. The work will be conducted in a manner that recognizes and respects these resources and the spiritual values of the area.	The tribes would like for the report to indicate that consultation with the Tribes will continue through and beyond the startup process. Specifically the Tribes would like for any changes that are made post the construction and startup process that deviate from the design as dictated in the final 100% BOD to require Tribal consultation prior to implementation.	See above			See response to Cocopah RTC #84.	This RTC was discussed at the August 18 TWG meeting. Tribes and DOI/BLM will discuss what changes during construction invoke Tribal consultation.
89	Chemehuevi/ TRC 1l	Design	CEQA/EIR	ES.1 Overview	Specifically, impacts to cultural	The tribes would like for the report to indicate that consultation with the Tribes will continue through and beyond the startup process. Specifically the Tribes would like for any changes that are made post the construction and startup process that deviate from the design as dictated in the final 100%	See above			See Chemehuevi/TRC RTC #85	A similar RTC (RTC #88) was discussed at the August 18

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					resources will be minimized by implementing the mitigation measures required by the Mitigation Monitoring and Reporting Program (MMRP; DTSC 2011a), adopted by DTSC in 2011 as part of the certified EIR (DTSC 2011b). In addition, mitigation measures have been and will continue to be implemented in accordance with the Programmatic Agreement (PA; BLM 2010); the Cultural and Historic Properties Management Plan (CHPMP; BLM 2012); the Cultural Impact Minimization Program (CIMP; PG&E 2014); and in consultation with the Tribes throughout the construction and startup process. The work will be conducted in a manner that recognizes and respects these resources and the spiritual values of the area.	BOD to require Tribal consultation prior to implementation.					TWG meeting. Tribes and DOI/BLM will discuss what changes during construction invoke Tribal consultation.
90	DTSC-9	Non-design	Editorial	ES.1 Overview/ Page vii	Data collected during the East Ravine Groundwater Investigation indicate that	The cited sentence should be revised. As constructed, the sentence can suggest that all bedrock groundwater occurs simultaneously in irregularly distributed, highly localized, and discontinuous water-bearing zones. The data indicates that bedrock groundwater typically occurs in irregularly distributed fractures. The basis for stating that the bedrock groundwater occurs in discontinuous water-bearing zones should be supported and clarified. As the bedrock formations are generally hydraulically connected to river fluctuations and the more permeable bedrock wells are suggested	The cited sentence will be edited as follows: "Data collected during the East Ravine Groundwater	Resolved.			Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					groundwater in bedrock occurs in irregularly distributed, highly localized, and discontinuous water-bearing zones, which is characteristic of fractured crystalline rocks.	to be connected with the alluvium, it is currently requested that the sentence be revised to omit "discontinuous water-bearing zones". Identical language and change requested on Section 2.2, Page 2-4.	Investigation indicate that groundwater in bedrock occurs in <u>an</u> irregularly distributed and <u>complex network of fractures</u> ~~discontinuous water-bearing zones~~, which is characteristic of fractured crystalline rocks." The same edits will be made to the sentence in Section 2.2, Page 2-4.				
91	MWD	Non-design	Editorial	ES.2/vii; Sect. 1.2.1/1-8	The Remedial Action Objectives (RAOs) for selected groundwater remedy at the Topock site.	California's MCL of 10 ug/L for hexavalent chromium is cited in Item No. 52 of Table 6.2-1 (Basis of Design Report/Pre-final 90% Design Submittal). California's MCL for hexavalent chromium should also be cited throughout the document whenever the water quality standards that support the designated beneficial uses of the Colorado River are referenced (such as in RAO #2 on page vii of the Executive Summary and in Section 1.2.1).	As mentioned in Item 100 of Table 6.2-1, reducing Cr(VI) concentrations in groundwater by implementation of the remedy will increase the level of certainty that surface water quality will continue to remain below the designated beneficial uses of the Colorado River. To date, surface water sampling in the Colorado River upstream, midstream, and downstream of the Topock site show concentrations of Cr(VI) less than the California Toxics Rule criteria of 11 µg/L (protection of freshwater aquatic life) and the California MCL for Cr(VI) of 10 µg/L. Surface water sampling will be conducted during remedy start-up and operations to confirm and document compliance with RAO #2. If Cr(VI), and manganese concentrations in surface water samples increase and are attributed to the Topock site, operational adjustments will be made according to the decision rules presented in the O&M Manual. If Cr(VI), arsenic, and manganese concentrations do not return to baseline as a result of operational adjustments, the				Comment resolved.

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							contingency plan will be implemented.				
92	FMIT-17	Non-design	Other	ES.2, p. vii	RAO #4	It is noted that RAO #4 addresses the *permanent* expansion of the “target remediation area.” Accordingly, this permits at least a temporary expansion. For example, the migration of the plume beyond its initial footprint.	Comment noted. Data will be collected as part of the Compliance Monitoring Program (Section 2.1 of the Sampling and Monitoring Plan, O&M Manual Volume 2) to ensure compliance with this RAO. As the remedy is implemented, data will be collected to determine whether operations or remedy components should be modified to meet the RAO. Groundwater samples will be collected periodically from the Compliance Monitoring Program well network outside the plume. The compliance monitoring wells outside the plume are shown on Figure 2.1-1 and listed in Table 2.1-3. The data collected will be analyzed to ensure that the concentrations of Cr(VI) and remedy by-products, specifically manganese and arsenic, do not permanently increase outside of the baseline Cr(VI) plume. Monitoring for COPCs will also be conducted as described in Section 5.1 and summarized in Table 2.1-6.			How the monitoring data outside the footprint will be used to differentiate whether the plume has temporarily or permanently expanded should be explained further.	DTSC Response: Monitoring data will continue to be reviewed throughout the life of the remedy. DTSC’s position is to maintain the water quality outside of the plume in compliance with the anti-degradation policy. Continuous exceedances or changes to the water chemistry outside of the plume will warrant discussion and careful evaluation. At a minimum, the required 5 year reviews will be a trigger for such an evaluation, if not earlier.
93	DTSC-10	Non-design	Process	ES.2, p vii	Attaining the cleanup criteria of 32 µg/L Cr(VI) in groundwater may be through active	The referenced text is not quite accurate. The use of “Monitored Natural Attenuation” is appropriate only after optimization of the active remedy and as a long term component to address residual hexavalent chromium as stated in the following paragraph on that page and per the January 31, 2010 statement of basis. Recommend changing the last part of the sentence to “…or monitored natural attenuation after active remediation has been employed and optimized.”	As recommended, the bullet will be revised as follows (<u>underline</u> for text addition): “Attaining the cleanup criteria of 32 µg/L Cr(VI)	Resolved.			Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					remediation or through natural attenuation.		in groundwater may be through active remediation or through <u>monitored natural attenuation (MNA) after active remediation has been employed and optimized</u>."				
94	FMIT-18	Design	Contingencies	ES.2, p. vii, beginning at 2nd para. from bottom and continuing onto p. viii.	Discussion of MNA as a long-term component of the groundwater remedy.	This section provides for the contingency of using MNA as a component remedy based on the recalcitrance of certain areas of the aquifer. Such decisions would be made during the 5-year review(s) on the basis of information gathered in the field. The concept of recalcitrance resulting from heterogeneities in the aquifer is understood, however, further insight as to what might be considered acceptable timeframes for such allowable MNA to occur. It is noted that the projected timeframe for the CMS/FS MNA scenario was considered unacceptable by the Regional Board. How might the timeframe(s) for MNA to achieve RAOs be viewed for these (presently unknown) recalcitrant areas? Has PG&E done any simulation to assess this using a reasonable sensitivity range? Is it likely that the MNA timeframes projected for recalcitrant areas be similarly viewed as unacceptable, thereby triggering future expansion of the remedy?	MNA would be applied following active remediation for relative smaller and/or lower concentration areas than the current plume that is to be remediated. The time for concentrations to reduce to less than 32 ppb would depend on the concentration, size and local hydrogeologic conditions of any recalcitrant portion(s) of the plume. Modeling has not been conducted of MNA of potentially recalcitrant areas following active remediation, and modeling results would be highly uncertain before the areas are identified and the factors affecting timeframe are known. It is possible that the timeframe could extend beyond the currently described 10 year MNA timeframe. Given that the aerial extent and potential mass in recalcitrant areas is anticipated to be much smaller relative to the current plume and that the fact that these areas are recalcitrant indicating limited mobility, the agencies may have a different view on the acceptability of timeframes for this portion of the remedy.			The Tribe is interested in hearing how the agencies may view the acceptability of the timeframes for recalcitrant areas differently.	The Agencies will evaluate the extent and mass of contamination of recalcitrant zones during 5-year reviews to determine if the current remedy is still effective. MNA is considered a long-term component of the remedy in addressing residual contamination.
95	DTSC-11	Design	Remedial design	ES.2 Remedial Action Objectives, Completion Criteria/ Performance Standards, and Short-Term	"Based on modeling, the current projection of the remedial timeframe is 30 years of active remediation	Item 1: The section introduces how MNA may be used in the remedy, but the cited sentence doesn't account for the likely effect that MNA would have on the cleanup schedule. Suggest adding the following sentence after the cited sentence, "This timeframe does not account for any additional time for monitoring that may be required if MNA is selected for portions of the plume. Item 2: Text should be revised to clarify why a remedial timeframe of 30 years is stated, yet modeling (see Figures 7.1-1 to 4 of the Appendix B modeling section) illustrates that the plume is not cleaned up after 30 years.	The 30 years of active remediation quoted in this comment refers to the target remedial timeframe. As discussed in Section 7.1 of the groundwater modeling Appendix B, the majority	Resolved.			Comment resolved.

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				Goals/ Page viii	followed by up to 10 years of long term monitoring and up to 20 years of arsenic monitoring."		of the alluvial Cr(IV) plume in all for model layers has been remediated by year 30 of the simulated transport run of the nominal case design. The alluvial aquifer Cr(VI) remaining at year 30 for the nominal case is a relatively small footprint located just upgradient of the central portion of the NTH IRZ, as shown on Figures 7.1-1 through 7.1-4. As discussed in this modeling section, optimization of the nominal case over time will be needed to reduce the timeframe toward the target of 30 years. One potential optimization, the addition of intermediate recirculation wells IRL-6 and IRL-7 at year 20 was evaluated in the modeling (Appendix B, Section 10.13). The results shown on Figures 10.13-1 and 10.13-2 indicate this intermediate recirculation well pair can reduce the remaining footprint of the Cr(VI) plume. In practice, routine data evaluations will be conducted to inform the remedy improvements needed to meet the 30 year timeframe target. The following edits will be made to clarify these points in the text (revisions are shown as <u>underline</u> for added text and ~~strikeout~~ as deleted text): "~~Based on modeling, the current projection of t~~ The anticipated remedial timeframe is 30 years of active remediation followed by up to 10 years of long term monitoring and up to 20 years of arsenic				

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							monitoring. <u>This timeframe does not account for any additional time for monitoring that may be required if MNA is selected for portions of the plume and extends past the 10 years of long term monitoring</u>."				
96	FMIT-19	Design	Remedial Design	ES.2, p. viii	Bullets describing OF & OPS	How do OF and OPS differ? Would it be possible to achieve one without the other? The paragraph above the bullets describes the development of short-term goals and criteria for such evaluations. When will this information be available? The FMIT would like to be involved in discussions during the development of these goals and criteria, as well as in the process of evaluating OF and OPS.	Section 6.2 (Functional Testing, Startup, and Transition to O&M) of the C/RAWP provides expanded discussions of OF and OPS and descriptions of activities involved in making OF and OPS determination. In brief, OPS determination overlaps with OF determination, and the two work in tandem to ensure that the remedy functions and operates properly and successfully. See also DTSC and DOI's responses to this comment.	DOI and DTSC have sole responsibility for the OF and OPS determinations, respectively. Short term goals and criteria are based on agencies' expectations of the design as proposed by the design. The agencies will openly discuss the rationale and approach with stakeholders and Tribes before setting those goals.	The NCP, 40 CFR§300.435(f)(2), states, "A remedy becomes 'operational and functional' either one year after construction is complete, or when the remedy is determined concurrently by EPA and the State to be functioning properly and is performing as designed, whichever is earlier. EPA may grant extensions to the one-year period, as appropriate." DOI, as the lead CERCLA agency, will make the OF determination in coordination with DTSC's OPS determination. DOI and DTSC have sole responsibility for the OF and OPS determinations, respectively, and will conduct a joint inspection at the conclusion of construction of the groundwater remedy to determine that it has been constructed properly. The joint inspection also marks the beginning of the one-year O&F period described above. After the remedy has been	Noted.	

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									operating for approximately one year, the determination of O&F signifies the end of the shakedown period, when the remedy is determined to be operating as designed.		
97	FMIT/TRC 1a	Non-design	Process	ES.2 Remedial Action Objectives, Completion Criteria/ Performance Standards, and Short- Term Goals	Monitored natural attenuation (MNA) is included as a long-term component of the groundwater remedy to address residual chromium that may remain in recalcitrant portions of the aquifer following efforts to enhance and optimize in-situ treatment and flushing systems during the O&M phase. Decisions on specific areas of the plume appropriate for MNA will be made during future evaluations, such as the 5-year reviews to be conducted by DTSC and DOI, based on information about the types and options for active remediation system adjustments, data evaluating the effectiveness of active remediation	What level of involvement in these types of decisions will be provided to the Tribal stakeholders? Please clearly communicate how the Tribes will be part of the data review and decision making process for future remedial design processes including decisions on areas eligible for MNA and when the appropriate timing for MNA?	The agencies will make the decisions regarding MNA cited in the referenced text. PG&E defers to the agencies for response on Tribal involvement in agencies' decision making process. During O&M, quarterly progress reports will be a key tool for PG&E to inform agencies, stakeholders, and Tribes of, amongst other things, operational status of the remedy and remedy performance including a description of the monitoring events and sampling performed during the current reporting period, the sampling results and interpretation of results (including volume of water collecte d and treated, Cr(VI) ma ss treated, influent-effluent data, etc.), an interpretation of progress toward RAOs, any request for material deviations from design documents and O&M Manual (e.g., gaps or inconsistencies in the site conceptual model) and agencies' actions. See Exhibit L2.2-2 (Quarterly Progress Report Template) of the O&M Manual for additional details. The reports will be submitted to DTSC and DOI, and will be posted on a SharePoint site for access by Tribes and stakeholders. Other	PG&E must submit all MNA proposals in writing for agency consideration. These proposals, however, must be based on their evaluation of the progress of the remedy. Furthermore, the remedy progress would be documented in the periodic (quarterly) remedy progress reports which will also be provided to all stakeholders as they are submitted. DTSC also expects PG&E to summarize and report significant information and findings of those periodic reports during the regular CWG meetings.	The DOI 2011 Record of Decision states " Because the variable nature of the geologic materials beneath the site may result in some localized areas being resistant to in-situ treatment and flushing, the Selected Remedy also includes monitored natural attenuation as a long term component to address residual Cr (VI) that may remain in portions of the aquifer formation after a majority has been treated by In-situ Treatment with Fresh Water Flushing." As part of the ongoing remedy review and during the 5-year review process, DOI and DTSC will evaluate the effectiveness of the remedy and determine if MNA is appropriate for areas where residual Cr(VI) remains that cannot be addressed through the more active in-situ treatment. PG&E will provide any documentation to support this determination. Tribes and stakeholders may	Please see response to comment FMIT/TRC RTC #44.	A similar RTC (RTC #99) was discussed at the August 18 TWG meeting.

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					systems, and location of proposed MNA areas relative to natural reductive zones in the aquifer.		venues for posting these reports may be utilized during the decades-long operation of the remedy.		provide input to the agencies for consideration during the ongoing remedy evaluation and 5-year review process.		
98	Hualapai/TRC 1a	Non-design	Process	ES.2 Remedial Action Objectives, Completion Criteria/ Performance Standards, and Short- Term Goals	Monitored natural attenuation (MNA) is included as a long-term component of the groundwater remedy to address residual chromium that may remain in recalcitrant portions of the aquifer following efforts to enhance and optimize in-situ treatment and flushing systems during the O&M phase. Decisions on specific areas of the plume appropriate for MNA will be made during future evaluations, such as the 5-year reviews to be conducted by DTSC and DOI, based on information about the types and options for active remediation system adjustments, data evaluating the effectiveness of active remediation systems, and location of proposed MNA areas relative	What level of involvement in these types of decisions will be provided to the Tribal stakeholders? Please clearly communicate how the Tribes will be part of the data review and decision making process for future remedial design processes including decisions on areas eligible for MNA and when the appropriate timing for MNA?	See above	See above	See above	See response to comment Hualapai/ TRC RTC #83.	A similar RTC (RTC #99) was discussed at the August 18 TWG meeting.

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					to natural reductive zones in the aquifer.						
99	Cocopah/TRC 1a	Non-design	Process	ES.2 Remedial Action Objectives, Completion Criteria/ Performance Standards, and Short- Term Goals	Monitored natural attenuation (MNA) is included as a long-term component of the groundwater remedy to address residual chromium that may remain in recalcitrant portions of the aquifer following efforts to enhance and optimize in-situ treatment and flushing systems during the O&M phase. Decisions on specific areas of the plume appropriate for MNA will be made during future evaluations, such as the 5-year reviews to be conducted by DTSC and DOI, based on information about the types and options for active remediation system adjustments, data evaluating the effectiveness of active remediation systems, and location of proposed MNA areas relative to natural reductive zones in the aquifer.	What level of involvement in these types of decisions will be provided to the Tribal stakeholders? Please clearly communicate how the Tribes will be part of the data review and decision making process for future remedial design processes including decisions on areas eligible for MNA and when the appropriate timing for MNA?	See above	See above	See above	See response to Cocopah RTC #84	This RTC was discussed at the August 18 TWG meeting.
100	Chemehuevi/	Non-design	Process	ES.2 Remedial	Monitored	What level of involvement in these types of decisions will be provided to the Tribal	See above	See above	See above	See Chemehuevi/TRC	A similar RTC (RTC

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	TRC 1a			Action Objectives, Completion Criteria/ Performance Standards, and Short- Term Goals	natural attenuation (MNA) is included as a long-term component of the groundwater remedy to address residual chromium that may remain in recalcitrant portions of the aquifer following efforts to enhance and optimize in-situ treatment and flushing systems during the O&M phase. Decisions on specific areas of the plume appropriate for MNA will be made during future evaluations, such as the 5-year reviews to be conducted by DTSC and DOI, based on information about the types and options for active remediation system adjustments, data evaluating the effectiveness of active remediation systems, and location of proposed MNA areas relative to natural reductive zones in the aquifer.	stakeholders? Please clearly communicate how the Tribes will be part of the data review and decision making process for future remedial design processes including decisions on areas eligible for MNA and when the appropriate timing for MNA?				RTC#85	#99) was discussed at the August 18 TWG meeting.
101	DTSC-12	Design	Editorial	ES.3 Summary of Engineering Design Parameters and	"Injection of fresh water to assist with flushing the chromium	Revise cited text as follows: "Injection of fresh water to <u>control and confine the plume migration to the west,</u> assist with flushing the chromium plume through the NTH IRZ, and to constrain westward spread of carbon-amended water and in-situ byproducts from the Inner Recirculation Loop." A main purpose of fresh water injection has always been to confine the chromium plume along the	The cited text will be edited as indicated in the comment in Section ES.3 and throughout the document.	Resolved.			Comment resolved.

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				Features/Key Changes from 60% to 90% Design/ Page ix	plume through the NTH IRZ and to constrain westward spread of carbon-amended water and in-situ byproducts from the Inner Recirculation Loop."	western boundary. Revise this and other similar text throughout the document (e.g., Section 3.3, page 3-30, C/RAWP Section 3.1, Page 3-1).					
102	DTSC-14	Design	Editorial	ES.3 Summary of Engineering Design Parameters and Features/Key Changes from 60% to 90% Design/ Page ix	"DTSC also notes that the removal of fluoride from fresh water is not warranted due to the elevated baseline fluoride concentrations (i.e., values already above the MCL) in the area where fresh water will be injected."	For accuracy, the sentence should be revised as follows, "DTSC also notes that the removal of fluoride from fresh water is currently not warranted as fresh water fluoride concentrations are similar to the concentrations in the injection area and both are ~~due to the elevated baseline fluoride concentrations (i.e., values~~ already above the MCL~~) in the area where fresh water will be injected~~." Make similar text change in Exhibit 3.3-1 page 3-34, and on page 3-36.	Revision will be made as requested.	Resolved.			Comment resolved.
103	DTSC-15	Non-design	Editorial	ES.3 Summary of Engineering Design Parameters and Features/Key Changes from 60% to 90% Design/ Page ix	"Conceptual visualizations of select features were prepared and are presented in Figures ES-5 through ES-7 to facilitate visualization of these remedy features. Based on inputs from Agencies, Interested Tribes, and Stakeholders and through further design development, a number of key adjustments were made between the intermediate (60%) and this pre-final (90%) design. Figures ES-8 through ES-11 illustrate the key changes	Correct typo as follows: "Conceptual visualizations of select features were prepared and are presented in Figures ES-5 through ES-~~7~~8 to facilitate visualization of these remedy features. Based on inputs from Agencies, Interested Tribes, and Stakeholders and through further design development, a number of key adjustments were made between the intermediate (60%) and this pre-final (90%) design. Figures ES-~~8~~9 through ES-11 illustrate the key changes graphically to facilitate visualization and understanding of these changes; detailed descriptions are provided in the body of this report."	Correction will be made as requested.	Resolved.			Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					graphically to facilitate visualization and understanding of these changes; detailed descriptions are provided in the body of this report."						
104	DTSC-13	Design	Infrastructures	ES, p X, second to last paragraph	Results from this evaluation will be included in the final (100%) design.	All design elements should be included in 90%. DTSC recommends PG&E to resolve this pipeline alignment and provide the design as soon as possible for evaluation.	Comment noted. PG&E's goal is to resolve the pipeline alignment referenced in the cited text during the 90% RTC period. PG&E has reviewed the recommended changes to this crossing and submitted the revised design for both the northern and southern crossings of Bat Cave Wash (see **Attachment C** of the final RTC table).	Resolved.			Comment resolved.
105	FMIT-20	Design	Infrastructures	ES.3. p. x	5th bullet describing staging areas and support zones	FMIT is opposed to certain staging areas/support zones identified. This is discussed further in regard to Figure 4.2-3 of the C/RAWP.	Please see RTC #860 FMIT/TRC, #861 Hualapai/ TRC, #862 Cocopah/TRC, and #863 Chemehuevi/TRC.				This RTC and other RTCs related to staging areas were discussed at the July 23, August 19, and August 26 TWG meetings.
106	MWD	Non-design	Other	ES-4/xi; Sect. 5.0/5- 1; Figure 5.1-1	Institutional Controls	Figure 5.1-1 shows the line for the approximate area for Category 1 Institutional Control going through the top left corner of Metropolitan's property. Section 5.0 is silent on property owned by Metropolitan that is within the southeastern area of the designated Area of Potential Effects (APE). Either the APE boundary should not include Metropolitan's property, or access and other control issues should be described.	As noted, the APE boundary includes a small area of MWD's property. At this time, PG&E does not propose groundwater remedial infrastructure nor plan to conduct remedial activities on MWD property. Therefore, PG&E does not request access to MWD's property for the purpose of remedial or investigative activities. Further, in discussions with DTSC and DOI, a Category 1 IC is determined to not be necessary at this time by the Agencies for the MWD property. The need for and effectiveness of institutional controls for the remedy will continue to be evaluated in the		The APE refers to the geographic area or areas within which an Undertaking may directly or indirectly cause alterations in the character or use of historic properties. The APE for this Undertaking was initially comprised of 1,600.69 acres of surface area, 325 and a section of the Colorado River. The Programmatic Agreement (PA) notes that "At each phase (workplan or design document) of implementation of the Undertaking, an evaluation will occur to determine if the APE should be amended." This		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							future, including during 5-year reviews to be conducted by DTSC and DOI.		evaluation will occur once the final groundwater remedy boundaries are determined. BLM will take the MWD comment into consideration during the evaluation. The PA also defines the process for revising the boundaries.		
107	FMIT-21	Design	Legal	ES.4	Summary of ICs	This section broadly describes IC categories potentially anticipated in conjunction with the remedy. FMIT believes it may be possible to use ICs to restrict certain categories of land use and access to areas of the site. This is important due to the somewhat unrestricted development and use activities that have occurred recently in adjacent areas.	PG&E will be discussing this comment, and its response to this comment, directly with counsel for DTSC and counsel for the Fort Mojave Indian Tribe.	DTSC will be communicating with FMIT directly regarding this matter.	Land use and access to federal property is addressed through the specific BLM Resource Management Plan and FWS Refuge Comprehensive Management Plan for the property. Institutional Controls are also addressed in the DOI Groundwater Record of Decision. Under the PA, the Tribal Access Plan has been established. BLM has taken measures to reduce potential for incursion by outside parties, e.g., recreational ORVs, and is scheduled to amend the Bullhead Travel Management Plan in FY 2016.	Relative to PG&E's comment, a brief discussion between counsel occur. Please see response to comment FMIT/TRC RTC #44. ed in. Relative to DOI's comments, the Tribe respectfully requests that an ACEC management Plan be developed. It remains unresolved when this plan will be drafted despite the RMP being adopted 8 years ago. The Tribe looks forward to direct discussion with DTSC regarding this matter.	DTSC Response: Tribal comment noted.
108	FMIT/TRC	Non-design	Process	ES.4 Summary of Institutional Controls	With respect to privately-owned lands, PG&E is in the process of obtaining Covenants access agreements from existing landowners or employing other similar mechanisms, as appropriate.	Please discuss the effects on remedial design if Covenants access agreements are not provided by private land owners. Could this cause changes in remedial design?	PG&E is working diligently to secure all necessary access agreements for remedy implementation, consistent with the requirements in the Corrective Action Consent Agreement between PG&E and DTSC and the Remedial Design/Remedial Action Consent Decree between PG&E and the United States, on behalf of DOI. If a needed access agreement cannot be obtained,	See RTCs #82 FMIT/TRC 1s, #83 Hualapai FMIT/TRC 1s, #84 Cocopah/ TRC 1s, and #85 Chemehuevi/TRC 1s above.	DOI agrees with the course of action presented by PG&E.	The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties to whom communication is addressed if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level	A similar RTC (RTC #110) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							PG&E will inform the Agencies and propose solutions which may include design modifications.			of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape. PG&E should remain mindful of its independent legal obligations under the 2006 Settlement Agreement to consult with FMIT and to provide all non-attorney-client privileged material information, documentary or otherwise, to the Tribe contemporaneously with its receipt or development by PG&E.	
109	Hualapai/TRC	Non-design	Process	ES.4 Summary of Institutional Controls	With respect to privately-owned lands, PG&E is in the process of obtaining Covenants access agreements from existing landowners or employing other similar mechanisms, as appropriate.	Please discuss the effects on remedial design if Covenants access agreements are not provided by private land owners. Could this cause changes in remedial design?	See above			Hualapai reiterates the need to be included (along with DOI and DTSC) as a primary party in communications regarding all project design changes, or work variance requests including material deviations from the design documents and/or C/RAWP due to discovery of changed site conditions as discussed in these earlier comments (at left). Communicating these changes needs to occur as soon as it is known that a change needs to be made. Hualapai needs to be included in those discussions via informing a tribal monitor, or email or telephone calls to designated points of contact. Once the change has been approved then a formal document can be forwarded to Hualapai.	A similar RTC (RTC #110) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.
110	Cocopah/TRC	Non-design	Process	ES.4 Summary of Institutional Controls	With respect to privately-owned lands, PG&E is in the process of obtaining	Please discuss the effects on remedial design if Covenants access agreements are not provided by private land owners. Could this cause changes in remedial design?	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material	This RTC was discussed at the August 18 TWG meeting. DTSC Response:

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					Covenants access agreements from existing landowners or employing other similar mechanisms, as appropriate.					deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	Tribal comment noted.
111	Chemehuevi/ TRC	Non-design	Process	ES.4 Summary of Institutional Controls	With respect to privately-owned lands, PG&E is in the process of obtaining Covenants access agreements from existing landowners or employing other similar mechanisms, as appropriate.	Please discuss the effects on remedial design if Covenants access agreements are not provided by private land owners. Could this cause changes in remedial design?	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	A similar RTC (RTC #110) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.
112	FMIT-22	Design	GW Modeling	ES.5	Summary of modeling	FMIT appreciates the inclusion of this summary, and agrees with the intended iterative application of models to evaluate remedy performance. FMIT requests ongoing involvement in the process of performance evaluation.	Comment noted, the model will be updated as necessary and will be at a frequency based on the data obtained. Please see also RTCs related to communication with Tribes including RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, #47 Chemehuevi/TRC, #97 FMIT/TRC-1a, #98 Hualapai/TRC-1a, #99 Cocopah/TRC-1a, #100 Chemehuevi/TRC-1a, #154 FMIT/TRC-1b, #155 Hualapai/TRC-1b, #156 Cocopah/TRC-1b, #157 Chemehuevi/TRC-1b, #941 FMIT/TRC, #942		Comment noted.	This response appears inconsistent with PG&E response in comment #76. Current annual adjustments do not appear adequate. Any time design or operations are adjusted/modified, the model input should be updated, re-calibrated and long-term scenarios re-run. If PG&E consultants do not wish to run the model every time something is adjusted/ modified --> then it should be adequately demonstrated to stakeholders that consultants fully	PG&E Response: Comment noted. Response was revised to be consistent with language from RTC #76 as follows: "The groundwater flow and transport model will be updated during the remedy installation, start-up, and operation phases in an effort to refine the predictive performance of the model. Per RTC#76, updates will be conducted according to the timetable described in Section

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)

Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							Hualapai/TRC, #943 Cocopah/TRC, and #944 Chemehuevi/TRC.			understand how long-term changes in system performance towards meeting RAOs is achieved. One important example would be when the current plume is expanded (i.e. area just east of northern current plume extent which has not reached river bank) into clean areas. RAO says any plume expansion should not be permanently. Another example would be making a change to system which results in future breakthrough of plume into Arizona GW, or which indicates direct flow into the river.	12 of Appendix B. Additional details are available in RTC #76." DTSC/DOI response: Tribal comment and PG&E's response noted.
113	FMIT/TRC	Non-design	Process	ES.5 Summary of Modeling	During system installation and baseline sampling, additional data will be collected that will refine the current conceptual model. Where appropriate, the data may be used to refine the design, for example, of remedial well screens and perhaps locations.	Where will this occur? Are the steps for this refinement outlined anywhere within the 90% BOD documents? What level of involvement will the Tribes have in this process?	The refinement of the well design is described in the C/RAWP Section 3.2.1.4. Please see RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, #47 Chemehuevi/TRC for communications with Tribes.	Please see RTC #44 FMIT/TRC		The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication to whom addressed if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape. PG&E should remain mindful of its independent legal obligations under the 2006 Settlement Agreement to consult with FMIT and to provide all non-attorney-client privileged material information, documentary or otherwise, to the Tribe contemporaneously	A similar RTC (RTC #115) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										with its receipt or development by PG&E.	
114	Hualapai/TRC	Non-design	Process	ES.5 Summary of Modeling	During system installation and baseline sampling, additional data will be collected that will refine the current conceptual model. Where appropriate, the data may be used to refine the design, for example, of remedial well screens and perhaps locations.	Where will this occur? Are the steps for this refinement outlined anywhere within the 90% BOD documents? What level of involvement will the Tribes have in this process?	See above			Hualapai reiterates the need to be included (along with DOI and DTSC) as a primary party in communications regarding all project design changes, or work variance requests including material deviations from the design documents and/or C/RAWP due to discovery of changed site conditions as discussed in these earlier comments (at left). Communicating these changes needs to occur as soon as it is known that a change needs to be made. Hualapai needs to be included in those discussions via informing a tribal monitor, or email or telephone calls to designated points of contact. Once the change has been approved then a formal document can be forwarded to Hualapai.	A similar RTC (RTC #115) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.
115	Cocopah/TRC	Non-design	Process	ES.5 Summary of Modeling	During system installation and baseline sampling, additional data will be collected that will refine the current conceptual model. Where appropriate, the data may be used to refine the design, for example, of remedial well screens and perhaps locations.	Where will this occur? Are the steps for this refinement outlined anywhere within the 90% BOD documents? What level of involvement will the Tribes have in this process?	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape	This RTC was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.
116	Chemehuevi/ TRC	Non-design	Process	ES.5 Summary of Modeling	During system installation and baseline sampling,	Where will this occur? Are the steps for this refinement outlined anywhere within the 90% BOD documents? What level of involvement will the Tribes have in this process?	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties	A similar RTC (RTC #115) was discussed at the August 18 TWG meeting.

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
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					additional data will be collected that will refine the current conceptual model. Where appropriate, the data may be used to refine the design, for example, of remedial well screens and perhaps locations.					communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape	DTSC Response: Tribal comment noted.
117	DTSC-16	Non-design	Editorial	Page xiii	Table ES-1 National Trails Highway In-situ Reactive Zone (NTH IRZ) "The system will be initiated with an anticipated initial total organic carbon (TOC) amendment concentration of 100 micrograms per liter (mg/L) to achieve sufficient lateral distribution of organic carbon while minimizing byproduct generation."	Micrograms per liter are cited in text, but abbreviated "(mg/L)". Units need to be corrected.	Correction will be made as requested.	Resolved.			Comment resolved.
118	MWD	Design	Remedial Design	Table ES- 1/xv; Sect. 3.5.3/3-60	Design Parameters/ Quantity: Supporting Facilities during remedy operation and maintenance	A leachfield is shown on Figures ES-4A and 3.5-4 on the Transwestern Bench as a Proposed Remedy Structure but is not listed in Tables ES-1 or Exhibit 3.5-2 nor is it discussed in the text in Section 3.5.3. What is the source of the discharges to the leachfield and what effect would the discharges have on groundwater flow and Cr (VI) plume movement? The leachfield is apparently not considered in the groundwater flow model as a recharge source.	The leach field on the Transwestern Bench was originally designed to serve sinks and toilets in the planned operations building; however, the leach field cannot be permitted with San Bernardino County given the proximity to planned extraction wells TWB-1 and TWB-2. The leach field will be replaced with a holding tank in the final design, and the referenced figures will be revised accordingly. Holding tank waste will				Comment resolved.

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							be pumped and hauled off site. Consequently, there will be no recharge source that could possibly affect the groundwater flow and Cr(VI) plume movement.				
119	MWD	Design	Remedial Design	Table ES- 1/xvi; Sect. 3.5/3-57	Design Parameters/ Quantity: SCADA	The SCADA should include Eh/Redox Potential with the various process and analytical instrumentation.	PG&E appreciates MWD input and has determined that field parameters collected during quarterly sampling is sufficient.				Comment resolved.
120	FMIT-23	Design	Infrastructures	Table ES- 1, note 7	Northern pipe bridge	FMIT needs to be involved in discussions re alternatives to the northern pipe bridge.	Please see RTC #19 FMIT-5.				
121	FMIT/TRC	Non-design	CEQA/EIR	TABLE ES-2A Estimated Borehole Count Associate d with Well Construction: Summary		How will an exceedance of the EIR well count limit be addressed? What additional EIR documents will be drafted to address this? What level of Tribal stakeholder involvement will be provided?		See RTC #22 FMIT-8.		Despite much discussion, the Tribes are left with nearly complete uncertainty as to how many drill holes will ultimately be completed during the life of the project, but are quite certain that at the present time it appears no limit on their number has been set or will be enforced by PG&E, DTSC, or DOI. Therefore, this comment is considered unresolved. The Tribes will review the upcoming Subsequent Groundwater EIR to ensure that it adequately address the cultural impacts that are associated with the increased number of wells proposed within the current iteration of the remedial design. The Tribes expect that the SEIR, and any future deviations from the work plan, will continue to incorporate Tribal concerns. The Tribe states its intended interest to stay involved with decisions addressing any deviations during implementation of the work plan with the same level of involvement that has occurred during the drafting of the work	A similar RTC (RTC #123) was discussed at the August 18 TWG meeting. Other RTCs related to well count were also discussed at the July 23 TWG meeting. DTSC Response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
										plan. The Tribe needs to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Tribes as well as to notify Tribes of the need for particular wells.	
122	Hualapai/TRC	Non-design	CEQA/EIR	TABLE ES-2A Estimated Borehole Count Associate d with Well Construction: Summary		How will an exceedance of the EIR well count limit be addressed? What additional EIR documents will be drafted to address this? What level of Tribal stakeholder involvement will be provided?		See above		Despite much discussion, Hualapai are left with uncertainty as to how many drill holes will ultimately be completed during the life of the project, but are quite certain that no limit on their number has been set Hualapai will review the upcoming Supplemental Groundwater EIR to ensure that it adequately address the cultural impacts that are associated with the increased number of wells proposed within the current iteration of the remedial design. The Tribes expect that the SEIR, and any future deviations from the work plan, will continue to incorporate Hualapai concerns. Hualapai state their intended interest to stay involved with decisions addressing any deviations during implementation of the work plan with the same level of involvement that has occurred during the drafting of the work plan. The Tribes need to be included in all	A similar RTC (RTC #123) was discussed at the August 18 TWG meeting. Other RTCs related to well count were also discussed at the July 23 TWG meeting. DTSC Response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
										alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Hualapai and other interested tribes as well as to notify Hualapai of the need for particular wells. Therefore, this comment is considered unresolved.	
123	Cocopah/TRC	Non-design	CEQA/EIR	TABLE ES-2A Estimated Borehole Count Associate d with Well Construction: Summary		How will an exceedance of the EIR well count limit be addressed? What additional EIR documents will be drafted to address this? What level of Tribal stakeholder involvement will be provided?		See above		Despite much discussion, the Tribes are left with nearly complete uncertainty as to how many drill holes will ultimately be completed during the life of the project, but are quite certain that no limit on their number has been set or will be enforced by PG&E, DTSC, or DOI. Therefore, this comment is considered unresolved. The Tribes will review the upcoming Supplemental Groundwater EIR to ensure that it adequately addresses the cultural impacts that are associated with the increased number of wells proposed within the current iteration of the remedial design. The Tribes expect that the SEIR, and any future deviations from the work plan, will continue to incorporate Tribal concerns. The Tribes state their intended interest to stay involved with decisions addressing any	This RTC was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										deviations during implementation of the work plan with the same level of involvement that has occurred during the drafting of the work plan. The Tribes need to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Tribes as well as to notify Tribes of the need for particular wells.	
124	Chemehuevi/ TRC	Non-design	CEQA/EIR	TABLE ES-2A Estimated Borehole Count Associate d with Well Construction: Summary		How will an exceedance of the EIR well count limit be addressed? What additional EIR documents will be drafted to address this? What level of Tribal stakeholder involvement will be provided?		See above		Despite much discussion, the Tribes are left with nearly complete uncertainty as to how many drill holes will ultimately be completed during the life of the project, but are quite certain that no limit on their number has been set or will be enforced by PG&E, DTSC, or DOI. Therefore, this comment is considered unresolved. The Tribes will review the upcoming Supplemental Groundwater EIR to ensure that it adequately addresses the cultural impacts that are associated with the increased number of wells proposed within the current iteration of the remedial design. The Tribes expect that the SEIR, and any future deviations from the work plan, will continue	A similar RTC (RTC #123) was discussed at the August 18 TWG meeting. Other RTCs related to well count were also discussed at the July 23 TWG meeting. DTSC Response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
										to incorporate Tribal concerns. The Tribes state their intended interest to stay involved with decisions addressing any deviations during implementation of the work plan with the same level of involvement that has occurred during the drafting of the work plan. The Tribes need to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Tribes as well as to notify Tribes of the need for particular wells.	
125	FMIT-24	Design	Editorial	Table ES- 2B	Key Assumptions	Figures illustrating the alternative well construction designs would be helpful.	Monitoring well design, including alternate well designs, is presented in Section 3.6. Detailed design drawings of the potential designs are included in Appendix D-2, Drawings C-16-01, C-16-02, and C-16-03.				
126	FMIT-25	Design	Monitoring	Table ES- 2B, Lines 28 & 29	Arizona monitor wells.	FMIT has concerns over the proposed locations of the sites at MW-X & MW-Y. As discussed later in reference to Figure 3.2-1. (Also shown on Figure ES-4A)	Comment noted.	See DTSC-6 comment on importance of sentry wells.			
127	FMIT/TRC	Design	Infrastructures	Table ES-2B	(same as C/RAWP Exhibit 3.1-2B)	ES-2B/Exhibit 3.1-2b should contain a final row with appropriate column totals, e.g., total number of boreholes, total number of planned boreholes, total number of future provisional boreholes, estimated replacement boreholes, and overall total of estimated boreholes.	These summations are provided in Table ES-2A, which summarizes the detail provided in Table ES-2B.			Comment noted.	A similar RTC (RTC #129) was discussed at the August 18 TWG meeting. Other RTCs related to well count were also discussed at the July 23 TWG meeting.
128	Hualapai/TRC	Design	Infrastructures	Table ES-2B	(same as C/RAWP Exhibit 3.1-2B)	ES-2B/Exhibit 3.1-2b should contain a final row with appropriate column totals, e.g., total number of boreholes, total number of planned boreholes, total number of future provisional boreholes, estimated replacement boreholes, and overall total of estimated boreholes.	See above			Comment noted.	A similar RTC (RTC #129) was discussed at the August 18 TWG meeting. Other RTCs related to well count were also discussed at the July

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
											23 TWG meeting.
129	Cocopah/TRC	Design	Infrastructures	Table ES-2B	(same as C/RAWP Exhibit 3.1-2B)	ES-2B/Exhibit 3.1-2b should contain a final row with appropriate column totals, e.g., total number of boreholes, total number of planned boreholes, total number of future provisional boreholes, estimated replacement boreholes, and overall total of estimated boreholes.	See above			Comment noted.	This RTC was discussed at the August 18 TWG meeting.
130	Chemehuevi/ TRC	Design	Infrastructures	Table ES-2B	(same as C/RAWP Exhibit 3.1-2B)	ES-2B/Exhibit 3.1-2b should contain a final row with appropriate column totals, e.g., total number of boreholes, total number of planned boreholes, total number of future provisional boreholes, estimated replacement boreholes, and overall total of estimated boreholes.	See above			Comment noted.	A similar RTC (RTC #129) was discussed at the August 18 TWG meeting. Other RTCs related to well count were also discussed at the July 23 TWG meeting.
131	FMIT-26	Non-design	Process	Figure ES- 1	Site cleanup process	Despite the representation of this figure as "Site Cleanup," it excludes the soils component, which is an important component in addition to the groundwater remedy. While it has been decided that the groundwater and the soils remedies will proceed on different tracks, it remains necessary to disclose that these two components in some way interact with each other. At a minimum, a footnote should be added to emphasize this fact.	As discussed in RTC #27 FMIT-13, much effort were put into integrating the soil information into the remedy design and coordinating with the Soil RFI/RI program to minimize duplication and disturbance. Soil information is prominently discussed and the integration of soil info/program is evident throughout the BOD, the O&M Manual, and the C/RAWP (refer to examples provided in RTC #27). Figure ES-1 is intended to illustrate the cleanup process and various phases for implementation of the groundwater remedy. This figure is not meant to include the soil component and adding a footnote is not necessary.	As the Tribes are aware, the potential need for cleanup of soil at the site can only be determined after the completion of the RFI/RI work plan for soil investigation and the appropriate risk assessment. It is important to note that DTSC has requested PG&E to consider the soil sampling locations relative to the groundwater remedy infrastructures so that soil sampling activities or potential remedy would not be hindered.			
132	FMIT-27	Non-design	Process	Figure ES- 2	Schedule	This schedule represents that "Tribal Communication and Tribal Consultation" is ongoing throughout the project timeframe. While this is appropriate, it would further be helpful to identify junctures where specific consultation with the tribes is intended. For example, prior to startup, prior to construction, etc.	PG&E defers to DOI/BLM for response to this comment. Please see RTCs #44 FMIT/TRC, #45 Hualapai/ TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC, for responses related to tribal communications by PG&E.	See RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC above.	Consultation will occur in accordance with the Programmatic Agreement (PA) and Appendix B [to the PA] - Consultation Protocol for the Topock Remediation Project.		
133	DTSC-17	Non-design	Editorial	Figure ES-3		Suggest adding FWIP area that was added to project area based on EIR addendum	Addition to Figure ES-3 will be made as requested.	Resolved.			Comment resolved.
134	DTSC-18	Design	Infrastructures	Figure ES-4A	MW-20 Bench	Aside from the additional carbon amendment building and storage tanks, will all other structures	Not all IM features on	See RTC # 1152			Comment resolved.

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						and tanks associated with the IM be removed as part of IM3 decommissioning? If not all, what will remain?	the MW-20 Bench will be removed as part of IM3 decommissioning. The brine storage and loading facility (three tanks, the truck lane, and associated pumps and piping) will remain and will be reused by the groundwater remedy in its existing location at the MW-20 Bench (see Section 1.3 of the IM-3 Decommissioning Work Plan for additional details).	regarding retention of addition IM infrastructure.			
135	DTSC-19	Design	Remedial design	ES.3 Summary of Engineering Design Parameters and Features/Key Changes from 60% to 90% Design	Figure ES-4D, Future Provisional/ Contingent Fresh Water Pipe	The document should comment on under what scenarios the Site B well would be used in the future. It would seem more prudent to blend with either wells Topock 2 or 3. A contingent boring/well could evaluate the old Topock 1 water quality and quantity in the future if ever needed as it is ideally located along the planned pipeline and would not require installation of thousands of feet of additional pipeline and trenches. The entire document should be revised to delegate utilization of the Site B well as a last resort. Less impactful alternatives (e.g., see above) should be evaluated and fully vetted prior to proposing selection of the Site B well.	Exhibit 3.3-2 of the 90% BOD and Table 2.3-1 of the Contingency Plan (O&M Manual Volume 3) outline potential scenarios under which water from Site B well could be used in the future. For each scenario, potential operational actions and possible contingency measures were identified. Operational actions (e.g., tie-in HNWR-1, rehabilitate a well) are more readily implementable than the contingency measure (e.g., use water from Site B, implement pre-injection treatment). The use of Site B is identified as a possible contingency measure under each scenario because of the associated added infrastructure (e.g., pipeline, pre-injection treatment system). As for blending with either wells Topock 2 or 3, it should be noted that, in order to separate the freshwater supply for TCS and remedy and ensure that the use of the infrastructure designed and constructed under this project is prioritized for remedy use first, the tie-in of Topock-2 and -3	As the only contingent fresh water supply source located away from the HNWR-1/1A area, the Site B well has water quality concerns as well as significant infrastructure impacts associated with it. Depending on future water supply problems/ needs (e.g., quality and/or quantity), pre-treatment to maintain California water quality (e.g. arsenic, chromium) may be required. Alternatively, PG&E may at some future time elect to investigate the possibility of another new water well in Arizona or California. As PG&E clarified during the August 26, 2015 TWG Meeting, the footprint of the ancestral Colorado River east of the Topock Marina in the general vicinity of Topock 1 is believed to have greater aquifer thickness and			

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							wells was eliminated in the 90% design (see 60% RTC 168 DTSC-63). However, as discussed in RTC #267 DTSC-67, Topock-2 and -3 wells can be tied in with added infrastructure within the Compressor Station footprint. In response to DTSC's request, additional details that describe this tie-in will be provided for review during the 90% RTC period and included in **Attachment E** of the final RTC table. If there is a competing need for Topock-2 and -3 water in the future, the first priority for this water, as noted in 60% RTC 168 DTSC-63, is for fire protection and operational needs at the Station, and that priority cannot be changed. Given the existing infrastructure identified in the design for remedy freshwater supply, and the listed contingency options, it is PG&E's opinion that an additional exploratory borehole/ well at the former Topock-1 location is not necessary. While the former Topock-1 site is located along the planned pipeline route, unlike Site B, it is in close proximity to/within habitat where sensitive biological receptors have been documented (Yuma clapper rail). With respect to EIR mitigation measure WATER-1, the site at Topock 1 is much closer to the bedrock outcrop near the Topock Marina. The proximity of this low permeability bedrock aquifer boundary would tend to focus and increase drawdown of a well pumping at Topock 1	transmissivity than to the west of the marina; therefore, it holds potential for a water well. DTSC does wish to clarify that the exact Topock 1 location was a recommendation and that other locations could also be considered. Finally, one would anticipate drawdown effects at Topock 2 and 3 and private wells associated with a new well in the ancestral Colorado area to be similar to HNWR-1 pumping if aquifer thickness were similar or if hydraulic conductivities were greater in the ancestral Colorado deposits. Regardless, the needed pumping rate for a future contingency pumping well might make this drawdown point moot.			

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							location. Therefore, pumping from a well at Topock 1 is more likely to result in measurable drawdown at Topock 2 and 3 and the domestic wells near the Topock Marina than pumping from HNWR-1A or Site B. It would be necessary to install and test a well at Topock 1 location to determine whether WATER-1 could be met at this location.				
136	DTSC-20	Design	Editorial	Figure ES-5		Since this is a simulation of new remedy building/structures, PG&E should also simulate the Transwestern North Access Road. Also, in ES-7, Trailers were depicted, but did not identify their purpose and ES-5 did not show these trailers. Are the trailers for remediation or station operations?	A simulation of the Transwestern North Access road will be added to Figure ES-5. The trailers depicted in Figure ES-7 are potential trailers used by PG&E and/or its contractors during construction and/or O&M of the groundwater remedy, not for station operations. The need for, the numbers, or types of trailers for remedy use may vary over time. Text will be added to the BOD and Figure ES-7 to reflect above. If helpful, temporary trailers can also be added to Figure ES-5. In addition, after additional evaluation of ways to further minimize remedy footprint/soil disturbance, PG&E proposes to move the carbon amendment facilities (i.e., carbon amendment building and storage tank) at the Transwestern Bench to the MW-20 Bench and consolidate dosing activities. This minimizes cutting into the hillside and resulting in less earthwork at the Transwestern Bench, while keeping the 90% fenced footprint on the MW-20 Bench the same. Further, PG&E proposes	Sheet C-08-03/04, **Attachment BB**, shows both a leach field and reserve leach field. These should be remove as the plan was not to have any leach fields as part of project.			**Attachment BB** was revised to incorporate DTSC's comments.

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							to move the Operations Building at the Transwestern Bench slightly to the east, away from the hillside, which again minimizes cutting into the hillside. The revised design was included in **Attachment BB** for review during the 90% comment resolution period.				
137	DTSC-22	Design	Remedial design	ES.3 Summary of Engineering Design Parameters and Features/Key Changes from 60% to 90% Design	Figure ES-6, Approximate Location of New Air Compressor Building (not shown, design in progress)	The Portable Generator Pad and Transformer/Switchgear structure are not show in figure ES-6 as compared to ES-10. The air compressor station building footprint is also not shown. The design of the new compressor building should not be "in progress" as stated. It needs to be developed ASAP. Visualizations should not include the old scrubber banks in the lower yard as they are no longer there. Current lower yard facilities should be used instead.	An updated Figure ES-6 was provided in the Supplemental 90%. In the updated Figure ES-6, the air compressor building is noted as Station facility and not a remedy feature (see RTC #839 DTSC-194). As discussed in RTC# 287, the remedy air compressor is located on the first floor of the Remedy-produced Water Conditioning Plant for remedy-produced water (see 90% drawing M-12-01). Like other elements of the remedy, the remedy air compressor was designed to the 90% level. The Station air compressor building is being designed by the Station on the Station's timeline. PG&E does not anticipate that construction of the Station air compressor building will overlap with construction of the remedy. The portable generator pad is just a reserved flat area behind the Remedy-produced Water Conditioning Plant, so it does not show on Figure ES-6. The transformer/ switchgear does not show on Figure ES-6 due to the angle of the photo. The purpose of Figure ES-6 and similar figures throughout the design reports is to facilitate	Resolved.			Comment resolved.

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							visualizations of the remedy features. Best available photo at the time of the work was selected for the simulation. A note will be added to Figure ES-6 that the scrubber banks at the lower yard were removed in 2014.				
138	DTSC-23	Design	Infrastructures	Figure ES-8	Photo simulation of MW-20 bench	Is the fire hydrant existing or new? If new, where is the water line coming from? If hydrant is used for onsite fires, how will PG&E control the run-off?	The simulated fire hydrant is new. Fire protection water for the MW-20 Bench will be supplied from the existing TCS freshwater storage tanks (Section 3.3.3.2, last sentence of last paragraph). Secondary containment is provided for all areas that may store or contain hazardous materials, e.g., the truck loading/unloading station, and the existing frac tanks area. The secondary containment can contain some runoff from a fire fighting event. In addition, the carbon amendment building is equipped with sprinklers and has an interior containment system that can contain discharge from the sprinkler heads (Section C.5.5, Appendix C Design Criteria).	Resolved.			Comment resolved.
139	FMIT-28	Design	Infrastructures	Figures ES-4D & ES-9	Future provisional pipeline in Arizona.	When and on what basis will a decision be made on the future provisional pipeline to Site B in Arizona?	Exhibit 3.3-2 of the 90% BOD and Table 2.3-1 of the Contingency Plan (O&M Manual Volume 3) outline potential scenarios under which water from the Site B well could be used in the future and therefore trigger the installation of the associated pipeline to Site B well. In summary, the potential scenarios include: • Well yield declines below the minimum required for optimal remedy operation • Quality of water in freshwater well				This RTC was discussed at the August 18 TWG meeting.

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							declines over time • Freshwater pumping causes adverse effects on water quality or capacity in nearby wells.				
140	DTSC-24	Design	Infrastructures	Figure ES-10		Why was the contingent Fresh Water Pre-Injection Treatment System building split into three parts? As shown in ES-10, they use to be one building, tanks and chemical storage, please explain the rationale for the design change from 60% to 90%.	While the total footprint of the contingent FWPTS has remained largely unchanged between 60% and 90% design (less than 10% difference), its layout has changed due to the elimination of fluoride treatment and addition of a remedy freshwater storage tank at 90%. **Attachment F** of the final RTC table includes Figure 3 of Appendix M of the 60% BOD and Figure 5 of the Appendix M of the 90% BOD which best illustrate the changes in spatial layout. As shown, the 90% system (Figure 5) has fewer tanks, vessels, and equipment due to the elimination of fluoride treatment. The building in the 90% is also slightly smaller than 60% to accommodate the additional remedy freshwater storage tank.	Resolved.			Comment resolved.
141	DTSC-25	Non-design	Editorial	Figure ES-11		Please provide outline of plume in figure. It is recommended that the chromium plume outline be depicted in aerial figures showing overall infrastructure to facilitate understanding of the relationship between the infrastructure and the plume.	The plume was not shown previously to avoid possibly overcrowding of these figures. At DTSC's request, the outline of the plume will be added to Figures ES-9, ES-11, and ES-12.	Resolved			Comment resolved.
142	DTSC-26	Non-design	Editorial	ES.3 Summary of Engineering Design Parameters and Features/Key Changes from 60% to 90% Design	Figure ES-11/ES-4A, PGE-01/PGE-02	Note: Wells PGE-01 and PGE-02 are incorrectly plotted. Please revise as figure is finalized. Revise GIS layer so other figures will plot them correctly as well.	Applicable figures in the BOD, O&M Manual, and C/RAWP will be revised as requested. See also RTC #866 DTSC-150.	Resolved			Comment resolved.
143	DTSC-27	Design	Contingency	Figure ES-13		SCADA system does not show process control for contingent Fresh Water Pretreatment system. Although this will be a contingency, PG&E should design all components in detail similar to PG&E's design level for contingency use of Well B in Arizona. Additions to the design document needed.	The remedy SCADA and control systems are designed to be adaptable to any future system control and data transmission needs. The	Resolved			Comment resolved.

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							SCADA and control connections to and details of those systems are determined when the design for each is completed. Figure ES-13 will be revised to include the FWPTS in the final BOD.				
Specific Comments – 90% BOD, Section 1: Introduction											
144	DTSC-28	Non-design	Editorial	SECTION 1 Introduction/ Page 1-2	"Following their review of this Freshwater Source Evaluation Technical Memorandum, the California Regional Water Quality Control Board, Colorado River Basin Region (RWQCB), subject to its invitation for PG&E to seek review by the State Water Resources Control Board (SWRCB), indicated that the HNWR-1 water would likely need treatment to remove naturally occurring arsenic prior to injection. In addition to the slightly elevated levels of arsenic in the HNWR-1 water, fluoride is present at slightly elevated levels. Water quality data at the area of injection exhibits high levels of naturally occurring fluoride."	Please revise the sentences to more accurately reflect site conditions: "Following their review of this Freshwater Source Evaluation Technical Memorandum, the California Regional Water Quality Control Board, Colorado River Basin Region (RWQCB), subject to its invitation for PG&E to seek review by the State Water Resources Control Board (SWRCB), indicated that the HNWR-1 water would likely need treatment to remove naturally occurring arsenic elevated above the MCL prior to injection. In addition to the slightly elevated levels of arsenic in the HNWR-1 water, fluoride wa~~i~~s also present at concentrations slightly above the MCL ~~elevated levels~~. Water quality data at the area of injection currently exhibits ~~high~~ similar levels of naturally occurring fluoride."	PG&E suggest the following edits (shown in green) to the suggested language: "Following their review of this Freshwater Source Evaluation Technical Memorandum, the California Regional Water Quality Control Board, Colorado River Basin Region (RWQCB), subject to its invitation for PG&E to seek review by the State Water Resources Control Board (SWRCB), indicated that the current HNWR-1 water would likely need treatment to remove naturally occurring arsenic elevated above the MCL prior to injection (see Table 1A of Final BOD, Appendix M). In addition to the slightly elevated levels of arsenic in the HNWR-1 water, fluoride wa~~i~~s also present at concentrations slightly above the MCL ~~elevated levels~~. Water quality data at the area of injection currently exhibits ~~high~~ similar levels of naturally occurring fluoride (see Final BOD, Section 2.3.4.5)."	Resolved			Comment resolved.
145	DTSC-29	Design	Contingencies	Page 1-2, Last Sentence	As such guidance was	If PG&E implements the fresh water pretreatment contingency, will PG&E's treatment goals be below MCL for arsenic and fluoride as stated? If not, please specify what the treatment goal would	If pre-treatment of freshwater is required	Resolved			Comment resolved.

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					still forthcoming at the time of the 60% BOD submittal on April 5, 2013, PG&E made the conservative assumption for freshwater treatment goals, specifically that the arsenic treatment goal was to below the federal/state maximum contaminant level (MCL) of 10 micrograms per liter (µg/L) and the fluoride treatment goal was to below the state MCL of 2 milligrams per liter (mg/L).	be.	per State Water Resource Control Board letter (November 2013), the goal would be to treat arsenic to below the federal/state MCL of 10 micrograms per liter (µg/L). Fluoride treatment is not warranted because, although fluoride concentration from Arizona source well might be slightly above the MCL (see Table 1A for HNWR-1 data), it is similar in concentration to the water at the injection area in California (see Section 2.3.4.5 for fluoride background value). Fluoride is proposed to be monitored in the freshwater source, see Table 5.2-4 of O&M Manual, Volume 2.				
146	DTSC-30	Non-design	Editorial	SECTION 1 Introduction/ Page 1-3	"DTSC further noted that removal of fluoride was not warranted due to the elevated baseline values already above the MCL where water will be injected."	Please revise the sentences to more accurately reflect DTSC's position: "DTSC further noted that removal of elevated fluoride from the Arizona supply water was not warranted ~~due to the elevated baseline values already above the MCL~~ as it was similar in concentration to the water at the injection area in California ~~where water will be injected~~."	Revision will be made as requested.	Resolved			Comment resolved.
147	DTSC-31	Non-design	Editorial	1.1.1 Description and History of SWMU 1/AOC 1 and AOC 10/ Page 1-6	"A recent (2013) discovery of a 1964 site record shows a steel pipe extending from a "water treatment chamber" at the former sludge drying bed area on the TCS to an "abandoned water well" in the bottom of Bat Cave Wash;	Please revise the sentences to more accurately reflect historic site conditions: "A recent (2013) discovery of a 1964 site record shows installation of a waste water treatment and disposal facility. A steel pipe extending from a "water treatment chamber" at the former sludge drying bed area on the TCS leads to an "abandoned water well" in the bottom of Bat Cave Wash.~~;~~ More detailed information ~~wa~~is provided in the RFI/RI Volume 1 Addendum (CH2M HILL 2014a)."	PG&E suggests potential edits (shown in green) to DTSC's edits: "A recent (2013) discovery of a 1964 site record/work order ~~shows~~ installation of a waste water treatment and disposal facility. A steel pipe extending from a "water treatment chamber" at the former sludge drying bed area on the TCS leads to an "abandoned water well" in the bottom of Bat Cave Wash.~~;~~ More	Resolved			Comment resolved.

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					detailed information was provided in the RFI/RI Volume 1 Addendum (CH2M HILL 2014a)."		detailed information ~~wa~~ is provided in the RFI/RI Volume 1 Addendum (CH2M HILL 2014a)."				
148	DTSC-32	Non-design	Editorial	1.1.1 Description and History of SWMU 1/AOC 1 and AOC 10/ Page 1-6	"DTSC had previously sampled some of the identified white powder materials."	The sentence as written is not informational, so revised language has been prepared, "DTSC had previously sampled some of the identified white powder materials in the AOC10d area and detected elevated levels of chromium."	Revision will be made as requested.	Resolved			Comment resolved.
149	DTSC-33	Design	Remedial design	1.2 Selected Final Groundwater Remedy and Requirements/ Page 1-7	"Extraction wells near the Colorado River (referred to as the River Bank Extraction Wells) to provide hydraulic capture of the plume, accelerate cleanup of the floodplain, and enhance the flow of contaminated groundwater through the IRZ line."	Revise objective description to be more accurate: "Extraction wells near the Colorado River (referred to as the River Bank Extraction Wells) to provide hydraulic capture of the plume, ~~accelerate~~ cleanup ~~of~~ the floodplain downgradient of the IRZ, and enhance the flow of contaminated groundwater through the IRZ line." The River Bank Extractors are the only active remedial feature that is cleaning up existing chromium contamination downgradient of the IRZ. A similar revision is needed for the C/RAWP Section 3.1, Page 3-1.	The cited text will be edited as indicated in the comment in Section 1.2 and in C/RAWP Section 3.1.	Resolved			Comment resolved.
150	DTSC-34	Design	Remedial Design	1.2.2 Incorporation of ARARs and EIR Mitigation Measures into the Design/ Page 1-9	"The chemical-specific ARARs have already been incorporated into the RAOs, ensuring that compliance with these ARARs will be attained when the remedy is complete (defined by attainment of the RAOs)."	The cited sentence should be revised as it is not accurate. All chemical-specific ARARs are not captured by RAOs (e.g., arsenic).	The RAOs of this remedial action were defined based on the conclusions of the groundwater risk assessment and ARARs identification (Section 3 of CMS/FS): • The groundwater risk assessment was completed to assist risk management decision-making by quantitatively evaluating COPCs in groundwater and surface water and determining whether the COPCs are potential threats to human health or the environment. The COPCs that are	Note: the groundwater risk assessment did not consider remedy produced byproducts including arsenic and manganese.			Comment resolved.

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							related to the facility and are identified as potential risks to human or ecological receptors are identified as COCs that then become the focus of the RAOs and remedial alternatives. The risk characterization concluded that based on the results of the risk estimates and the fact that the presence of Cr(VI) is related to historical releases from SWMU 1/AOC 1, Cr(VI) is a COC for this remedial action. • CERCLA requires that remedial action attain ARARs unless they are waived. The identified site-specific ARARs for Topock were included in the ROD. Chemical-specific ARARs are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in the establishment of a remediation goal. While in-situ byproducts such as arsenic and manganese have been disclosed and thoroughly evaluated the CMS/FS (e.g., in the alternatives analysis, Appendix G – In-Situ Reactive Zone Treatment Design Elements) and fully considered in the design documents (e.g., in the evaluation of compliance with ARARs,	DTSC wishes to go on record to clearly indicate that in-situ byproducts such as arsenic and manganese are a concern to the Department and will need to be monitored to ensure they do not impart excessive risk or exceed established ARARs (e.g., MCLs, Water			

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							the fate and transport modeling, the Sampling and Monitoring Plan, etc.), they are not COCs for this remedial action and therefore, not part of the RAOs. The cited text will be revised to read as follows: "The chemical-specific ARARs for the site COCs (Cr[VI], Cr[T]) have already been incorporated into the RAOs, ensuring that compliance with these ARARs (for the site COCs) will be attained when the remedy is complete (defined by attainment of the RAOs). Evaluation of the compliance with chemical specific ARARs for arsenic in the freshwater source is addressed in Table 6.2-1 Summary of Compliance with Identified ARARs (Items 2, 52, 99, and 100)."	Board Basin Plan Objectives/Resolutions, etc.).			
151	DTSC-35	Non-design	Other	Section 1.1.3	Ecological Resources	Recently the California Fish and Wildlife Service submitted comments to the Soil Investigation EIR which notified DTSC that the Townsend's Big-eared bat is a candidate for protection, and requires immediate protection under Fish and Game Code 2050-2069. Since a thorough bat survey has not been completed for the groundwater remedy related project area, it might be important to note the possible presence of this protected bat around the area. PG&E must identify all critical biological resources. Failure to do so will, at a minimum, lead to delays in the project.	Text will be revised to read that "Townsend's big-eared bat is a candidate species for State protection. A single male Townsend's big-eared bat was detected within the project area during the 2015 spring bat survey.	Resolved.			Comment resolved.
152	DOI-2	Non-design	Other	1.2.1/1-8	…short-term goals and criteria are being developed in coordination with DTSC and DOI to facilitate remedy performance assessments…	Suggest adding a statement on how short term goals will be documented and approved by DTSC/DOI.	Please see RTC #96 FMIT-19 .	See RTC #96 FMIT-19.			Resolved
153	MWD	Non-design	Editorial	Sect.1.2.1/ 1-8	"Prevent or minimize migration of total chromium (Cr[T]) and Cr(VI) to ensure	As identified in Item No. 100 of Table 6.2-1, clarify that 11 ug/L refers to California Toxics Rule criteria.	The 11 µg/L Cr(VI) is the water quality standard which is based upon the California Toxics Rule criteria. As noted in RTC #91				Comment resolved.

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					concentrations in surface water do not exceed water quality standards that support the designated beneficial uses of the Colorado River (11 g/L Cr[V1]).		MWD, to date, surface water sampling in the Colorado River upstream, midstream, and downstream of the Topock site show concentrations of Cr(VI) less than the California Toxics Rule criteria of 11 µg/L (protection of freshwater aquatic life) and the California MCL for Cr(VI) of 10 µg/L. Surface water sampling will be conducted during remedy start-up and operations to confirm and document compliance with RAO #2. If Cr(VI), arsenic, and manganese concentrations in surface water samples increase and are attributed to the Topock site, operational adjustments will be made according to the decision rules presented in the O&M Manual. If Cr(VI), arsenic, and manganese concentrations do not return to baseline as a result of operational adjustments, the contingency plan will be implemented.				
154	FMIT/TRC 1b	Non-design	Process	1.2.1 Remedial Action Objectives, Completion Criteria/Performance Standards, and Short- Term Goals	Pursuant to Exhibit A to the Settlement Agreement between DTSC and the FMIT (DTSC 2012b), the groundwater remedy is considered to be OPS when a) the remedy is operating as designed, b) the information obtained from remedy operation indicates that the remedy is protective of human health	What level of involvement will the Tribes have in data review during the OPS phase of the remedial design? What level of technical support will be made available to the tribes through this phase?	As mentioned in Section 6 of the C/RAWP, data will be collected for OPS determination in the O&M period. During O&M, quarterly progress reports will be prepared to present data and interpretation of results (see Exhibit L2.2-2, Quarterly Progress Report Template). It should be noted that OPS evaluation will not be made quarterly. The quarterly reports will be submitted to DTSC and DOI, and will be posted on a SharePoint site for access by Tribes and stakeholders. Other venues for posting these reports may be utilized during the decades-long	See RTC #96 FMIT-19.	Noted.		A similar RTC (RTC #156) was discussed at the August 18 TWG meeting.

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					and the environment, and c) the remedy is likely to be able to achieve the cleanup levels or performance goals delineated in the DTSC SOB (DTSC 2011a) and the DOI ROD (DOI 2010) for the groundwater remedy at the PG&E Topock Site. In general, OPS is expected within 1 to 2 years of the beginning of remedy start-up.		operation of the remedy. Pursuant to EIR Mitigation Measure CUL-1a-4, PG&E worked with representative members of the Interested Tribes to create a multidisciplinary panel of independent scientific and engineering experts as part of a Technical Review Committee (TRC). CUL-1a-4 states that "[u]pon conclusion of the construction phase of the project, the necessity and dollar value of the TRC shall be assessed by PG&E and, with the approval of DTSC, shall either be extended, reduced, or terminated under the operations and maintenance phase." Thus, DTSC will be responsible for determining whether and to what extent the TRC continues during operation and maintenance.				
155	Hualapai/TRC 1b	Non-design	Process	1.2.1 Remedial Action Objectives, Completion Criteria/Performance Standards, and Short- Term Goals	Pursuant to Exhibit A to the Settlement Agreement between DTSC and the FMIT (DTSC 2012b), the groundwater remedy is considered to be OPS when a) the remedy is operating as designed, b) the information obtained from remedy operation indicates that the remedy is protective of human health and the environment, and c) the remedy is likely	What level of involvement will the Tribes have in data review during the OPS phase of the remedial design? What level of technical support will be made available to the tribes through this phase?	See above	See above	See above		A similar RTC (RTC #156) was discussed at the August 18 TWG meeting.

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					to be able to achieve the cleanup levels or performance goals delineated in the DTSC SOB (DTSC 2011a) and the DOI ROD (DOI 2010) for the groundwater remedy at the PG&E Topock Site. In general, OPS is expected within 1 to 2 years of the beginning of remedy start-up.						
156	Cocopah/TRC 1b	Non-design	Process	1.2.1 Remedial Action Objectives, Completion Criteria/Performance Standards, and Short- Term Goals	Pursuant to Exhibit A to the Settlement Agreement between DTSC and the FMIT (DTSC 2012b), the groundwater remedy is considered to be OPS when a) the remedy is operating as designed, b) the information obtained from remedy operation indicates that the remedy is protective of human health and the environment, and c) the remedy is likely to be able to achieve the cleanup levels or performance goals delineated in the DTSC SOB (DTSC 2011a) and the DOI ROD (DOI	What level of involvement will the Tribes have in data review during the OPS phase of the remedial design? What level of technical support will be made available to the tribes through this phase?	See above	See above	See above		This RTC was discussed at the August 18 TWG meeting.

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					2010) for the groundwater remedy at the PG&E Topock Site. In general, OPS is expected within 1 to 2 years of the beginning of remedy start-up.						
157	Chemehuevi/ TRC 1b	Non-design	Process	1.2.1 Remedial Action Objectives, Completion Criteria/Performance Standards, and Short- Term Goals	Pursuant to Exhibit A to the Settlement Agreement between DTSC and the FMIT (DTSC 2012b), the groundwater remedy is considered to be OPS when a) the remedy is operating as designed, b) the information obtained from remedy operation indicates that the remedy is protective of human health and the environment, and c) the remedy is likely to be able to achieve the cleanup levels or performance goals delineated in the DTSC SOB (DTSC 2011a) and the DOI ROD (DOI 2010) for the groundwater remedy at the PG&E Topock Site. In general, OPS is expected within 1 to 2 years of the beginning of remedy start-	What level of involvement will the Tribes have in data review during the OPS phase of the remedial design? What level of technical support will be made available to the tribes through this phase?	See above	See above	See above		A similar RTC (RTC #156) was discussed at the August 18 TWG meeting.

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					up.						
158	DTSC-36	Non-design	CEQA/EIR	Section 1.2.2	EIR Project Area	In addition to the January 2011 certified EIR, DTSC has also completed an EIR addendum to change the project boundary to incorporate the fresh water well locations. Please add language to the design document and update project area maps for accuracy.	Text will be added to Section 1.2.2 to discuss the August 2013 EIR addendum and applicable figures in the design documents will be updated to incorporate the area added pursuant to the 2013 Addendum.	Resolved.			Comment resolved.
Specific Comments – 90% BOD, Section 2: Baseline Site Conditions and Pre-Design Work											
159	DTSC-37	Non-design	Editorial	2.3.3 General Geochemical Indicator Parameters/ Page 2-9	"They are natural compounds that are abundant in the area, as evidenced by their ubiquitous concentrations in the region and across the Colorado River. There are multiple sources of dissolved salts, including geologically older groundwater upwelling across the southern portion of the Mohave basin, evaporite minerals in the aquifer matrix, and evapotranspiration associated with the more vegetated areas of the floodplain, etc. (CH2M HILL 2009a)."	Add the following sentence after the cited sentences to clarify that since the chromium plume is not natural, the TDS associated with the chromium plume would also not be natural within the confines of the plume footprint: "Of course, TDS associated with the chromium plume would have mixed to some degree with the naturally occurring TDS within the aquifer (see last paragraph in this subsection)."	The following statement will be inserted after the cited text in Section 2.3.3. "Of course, TDS associated with the chromium plume could have mixed to some degree with the naturally occurring TDS within the aquifer (see last paragraph in this subsection)."	Resolved.			Comment resolved.
160	DTSC-38	Non-design	Editorial	2.3.3.1 Total Dissolved Solids/ Page 2-10	"Most plume wells are screened close to the bedrock surface."	Delete this sentence as it is not accurate as written (e.g., shallow zone wells are not screened close to the bedrock surface).	This sentence is from the RFI/RI Vol 2 Report (Section 6.5.1, page 6-26, last paragraph), with only the figure reference from that report's sentence deleted. Shallow wells refer to those wells screened near the water table, but if the aquifer is thin in a	Resolved.			Comment resolved.

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							particular location, that screen can also be much closer to the bedrock surface than a shallow well in a thicker part of the aquifer. Figure 5-20 from the RFI/RI Vol 2 Report shows that 17 out of 31 plume wells are screened within 50 feet of the bedrock surface, whereas only seven out of 50 non-plume wells are screened within this same distance of bedrock. The figure shows the same relationship between TDS and screen distance from bedrock for both non-plume and plume wells. This is an artifact of plume characterization concentrated at the up-gradient fringes of the Alluvial Aquifer. The sentence will be deleted as requested.				
161	DTSC-39	Design	Monitoring	2.3.4 Freshwater Injection Area Baseline Concentrations / Page 2-11	"Data from wells listed above are expected to represent the proposed southern injection area as well as the remaining injection areas along the corridor that extends from the northwest boundary of the plume at IRL-1 to the southwest boundary at FW-2."	Delete the cited sentence and replace with the following: "New monitoring and remedy wells to be installed as part of the groundwater remedy will assist in assessing baseline concentrations in the injection areas."	Since existing wells will continue to be used to assess baseline conditions and for consistency with RTC #167 DTSC-41, PG&E propose potential edits (shown in green) to DTSC's edits: "New monitoring and remedy wells to be installed as part of the groundwater remedy will be combined with existing wells described above ~~assist~~ in assessing baseline concentrations in the injection areas. For the reasons noted by DTSC in 90% RTC #161 DTSC-39, certain existing wells, MW-13, MW-14, MW-35, MW-37, MW-40, and OW-5 cluster will be re-evaluated and discussed with the agencies prior to assessing baseline concentrations."	For the purpose of assessing baseline concentrations in freshwater injection areas, DTSC requests the following changes to the list of existing wells: **Remove**: MW-13, MW-37, and MW-40: within plume boundary (not appropriate for baseline) MW-14 and MW-35: both wells contained chromium above 32 ppb in past. **Add**: OW-5 cluster			Comment resolved.
162	DTSC-40	Design	Monitoring	2.3.4	"Constituents	Revise the sentence as follows to allow for additional monitoring, "At a minimum, constituents that	Revision will be made as	Resolved.			Comment resolved.

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				Freshwater Injection Area Baseline Concentrations / Page 2-11	that will be monitored during injection include the COPCs (molybdenum, selenium, and nitrate), manganese (an in-situ byproduct), and fluoride (a general geochemical indicator parameter)."	will be monitored during injection will include the COPCs (molybdenum, selenium, and nitrate), manganese (an in-situ byproduct), and fluoride (a general geochemical indicator parameter)." Monitoring for additional constituents will be required (i.e., arsenic) or prudent to track fresh/river bank water travel/influence over time.	requested.				
163	FMIT/TRC	Non-design	Monitoring	2.3.4 Freshwater Injection Area Baseline Concentrations p. 2-11	Constituents that will be monitored during injection include the COPCs (molybdenum, selenium, and nitrate), manganese (an in-situ byproduct), and fluoride (a general geochemical indicator parameter).	Why is arsenic not listed here?	Monitoring for arsenic in the freshwater injection area is included in Section 2.2.4 of the O&M Manual Volume 2. The data collection program for arsenic in freshwater injection area is based upon requirements put forth in the State Board letter dated November 20, 2013. Baseline arsenic concentrations in new and existing monitoring wells will be collected prior to the start of freshwater injection. See Section 2.2.4 of O&M Manual Volume 2 for the data collection and assessment of baseline concentrations for arsenic from freshwater injection.			The Tribe reiterates its desire to have arsenic monitored in the injection water rather than sampling for arsenic only after it has been injected into the California aquifer.	Monitoring of arsenic in freshwater at HNWR-1 is addressed in the O&M Plan, Volume 2 Sampling & Monitoring Plan Section 5.2.
164	Hualapai/TRC	Non-design	Monitoring	2.3.4 Freshwater Injection Area Baseline Concentrations p. 2-11	Constituents that will be monitored during injection include the COPCs (molybdenum, selenium, and nitrate), manganese (an in-situ byproduct), and fluoride (a general geochemical indicator parameter).	Why is arsenic not listed here?	See above			Hualapai reiterate the desire to have arsenic monitored in the injection water rather than sampling for arsenic only after it has been injected into the California aquifer.	DTSC/DOI Response: See RTC 163
165	Cocopah/TRC	Non-design	Monitoring	2.3.4 Freshwater Injection Area Baseline	Constituents that will be monitored during injection	Why is arsenic not listed here?	See above			The Tribes reiterate the desire to have arsenic monitored in the injection water rather	DTSC/DOI Response: See RTC 163

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				Concentrations p. 2-11	include the COPCs (molybdenum, selenium, and nitrate), manganese (an in-situ byproduct), and fluoride (a general geochemical indicator parameter).					than sampling for arsenic only after it has been injected into the California aquifer.	
166	Chemehuevi/ TRC	Non-design	Monitoring	2.3.4 Freshwater Injection Area Baseline Concentrations p. 2-11	Constituents that will be monitored during injection include the COPCs (molybdenum, selenium, and nitrate), manganese (an in-situ byproduct), and fluoride (a general geochemical indicator parameter).	Why is arsenic not listed here?	See above			The Tribes reiterate the desire to have arsenic monitored in the injection water rather than sampling for arsenic only after it has been injected into the California aquifer.	DTSC/DOI Response: See RTC 163
167	DTSC-41	Design	Monitoring	2.3.4 Freshwater Injection Area Baseline Concentrations / Page 2-11	"These data form the baseline condition for the freshwater injection areas."	Revise the sentence as follows to acknowledge that new monitoring data will be utilized to update baseline conditions, "These data form the baseline condition for the freshwater injection areas<u> and will be updated with data from new wells before remedial system start up</u>." Include a section in the design that will document when the update will be done and what it will encompass. This section should be referenced within this portion of the document.	Agreed. The sentence will be changed as written, and the following text will be added to Section 2.3.4: "<u>It is anticipated that the update could be done as early as one year after a few sampling events at the new wells. This would involve updating Section 2.3.4 including Table 2.3-2 to incorporate data from new wells. The timing of the update will depend on the stability of observed concentrations in each new well. Some site wells have taken time to equilibrate with the aquifer following installation, and if a new well shows a continuous increase or decrease in one or more constituents, more time will be allotted for additional sampling before representative values are incorporated</u>	Resolved.			Comment resolved.

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							into the baseline update. The updates to the injection area baseline may or may not change the range and statistics of baseline concentrations."				
168	DTSC-42	Non-design	Editorial	2.3.4.1 Molybdenum/ Page 2-11	Average molybdenum concentrations in the injection area range from 8.77 to 46.01 µg/L, with a mean around 20 µg/L. The calculated UTL for this injection area dataset is 46.8 µg/L (Table 2.3-2), which exceeds the background UTL of 36.3 µg/L. The wells within the influence of IM-3 injection (i.e., the OW- and CW- well clusters presented in Table 2.3-2) have all shown breakthrough of IM-3 effluent water, which contains much lower molybdenum concentrations than the native groundwater. As a result, the average values for these wells have been skewed downward by the IM-3 injection operations. Pre-breakthrough concentrations in some of these wells ranged between 50 and 90 µg/L	The following portions of the cited paragraphs should be revised to more accurately reflect site conditions: "The calculated UTL for this injection area dataset is 46.8 µg/L (Table 2.3-2), which exceeds the background UTL of 36.3 µg/L. Two of the 27 wells currently exhibit concentrations slightly in excess of the background UTL (Table 2.3-2 and Figure 2.3-2). Most of the wells within the influence of IM-3 injection (i.e., the OW- and CW- well clusters presented in Table 2.3-2) have ~~all~~ shown breakthrough of IM-3 effluent water... These data demonstrate that the deeper zones of the injection area contain~~s~~ moderately elevated natural molybdenum concentrations compared to the dataset used for the regional background study."	The first two suggested changes will be included. The second sentence changes will be modified to read: "~~Most~~ Of the wells within the influence of IM-3 injection (i.e. the OW- and CW- well clusters presented in Table 2.3-2), 16 of the 17 wells have water quality that either approaches or is equivalent to that ~~shown breakthrough~~ of the IM-3 effluent water." The third change will be revised to state: "...the deeper zones of the injection area typically contained moderately elevated natural molybdenum concentrations compared to the dataset used for the regional background."	Resolved.			Comment resolved.

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					during the period 2004-2006. These data demonstrate that the injection area contains moderately elevated natural molybdenum concentrations compared to the dataset used for the regional background study.						
169	DTSC-43	Non-design	Editorial	2.3.4.3 Nitrate/ Page 2-11	"Because there are no non-plume wells in the injection area at the mountain front, a natural nitrate level cannot be clearly defined for this area. The three wells with the highest nitrate concentrations in the present data set, MW-14, MW-15, and MW-40S, are the closest to the mountain front recharge area, suggesting higher concentrations may be encountered when new data are collected during remedy construction."	The following portions of the cited paragraph should be revised as indicated to better describe site conditions, "Because there are no non-plume wells in the injection area at the mountain front, a natural nitrate level cannot be clearly defined for <u>the southern</u> area. ~~The three wells with the highest nitrate concentrations in the present data set, MW-14, MW-15, and MW-40S, are the closest to the mountain front recharge area, suggesting higher concentrations may be encountered when new data are collected during remedy construction~~. "<u>New remedy wells should assist in determining non-plume nitrate concentrations for the south western portion of the Bat Cave Wash area."</u> The sentence above was deleted to minimize speculation. Well MW-14 has been contaminated in the past and MW-40S is near MW-14 and contaminated well MW-40D.	The suggested changes will be made to the revised text.	Resolved.			Comment resolved.
170	DTSC-44	Non-design	Editorial	2.3.4.4 Manganese/ Page 2-11		Revise the section to indicate that the manganese well cluster data (i.e., Table 2.3-2) suggests that the deeper portion of the aquifer always exhibits greater manganese concentrations than the corresponding shallow well within the cluster.	The following text will be added to Section 2.3.4.4: "<u>The manganese concentrations in the deep zone are generally higher than those in the shallow zone. This is consistent with the generally more reducing</u>	Resolved.			Comment resolved.

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							conditions in the deep zone, in which manganese oxide minerals are reductively dissolved to a greater degree. Though this difference between shallow and deep concentrations is fairly consistent in the injection area, it should be noted that the some of the differences reported in Table 2.3-2 are skewed upward by anomalously high manganese values reported in the early samples collected from some of the deep zone wells."				
171	DTSC-45	Design	Remedial design	2.4.1 Land Ownership, Disturbance, and Development/Page 2-13	"An inventory of existing infrastructure outside the Compressor Station has been conducted and is included in Figure 2.4-1A)."	Figure 2.4-1A was not included in the 90% document and needs to be included.	Figure 2.4-1A was distributed to agencies, Tribes, and stakeholders for review on October 15, 2014. This figure will be included in the BOD.	Resolved.			Comment resolved.
172	FMIT/TRC	Non-design	Editorial	2.4.1 Land Ownership Disturbance, and Development p. 2-13	Land owners and leaseholders will have to grant permission to access their property for construction and operation of groundwater remedy facilities or equipment.	As worded it seems as though the landowner has no choice but to grant access permission. This is inconsistent with statements made previously which indicated permission for use of private land will need to be obtained from the landowner. Please confirm or reword. In addition please provide information on what access agreements to date have been obtained, and discuss in more detail what additional permissions are outstanding for use of private lands.	The intent of the cited text is to recognize that the landowners will need to grant permission before PG&E can access their property for construction and O&M of the remedy. The text will be revised to state that PG&E will obtain permission from landowners and leaseholders to access their property for construction and operation of groundwater remedy facilities or equipment. Sections 5.3.2 (Access to non-federal lands) and 5.3.3 (Other Anticipated Approvals, Permits, and Agreements) listed the approvals/permits/agreements PG&E anticipates obtaining for this project. As discussed in RTCs #82 FMIT/TRC, #108 FMIT/ TRC, and			In the case access rights are not granted to PG&E resulting in changes to the final design, the Tribe expects any future deviations from the work plan, will continue to incorporate Tribal concerns and Tribal participation. The Tribe states their intended interest to stay involved with any deviations from the work plan with the same level of involvement that has occurred during the drafting of the work plan. The Tribe needs to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or	A similar RTC (RTC #174) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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							#875 DOI-138, PG&E is working diligently to secure all necessary access agreements for remedy implementation. PG&E is working towards obtaining all non-federal access agreements within 30 days of DTSC's approval of the Final Design and C/RAWP and within 90 days of DOI's request for such access agreements, consistent with the timing requirements in the Corrective Action Consent Agreement between PG&E and DTSC and the Remedial Design/Remedial Action Consent Decree between PG&E and the United States, on behalf of DOI.			replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Tribes as well as to notify the Tribe of the need for particular wells.	
173	Hualapai/TRC	Non-design	Editorial	2.4.1 Land Ownership Disturbance, and Development p. 2-13	Land owners and leaseholders will have to grant permission to access their property for construction and operation of groundwater remedy facilities or equipment.	As worded it seems as though the landowner has no choice but to grant access permission. This is inconsistent with statements made previously which indicated permission for use of private land will need to be obtained from the landowner. Please confirm or reword. In addition please provide information on what access agreements to date have been obtained, and discuss in more detail what additional permissions are outstanding for use of private lands.	See above			In the case access rights are not granted to PG&E resulting in changes to the final design, Hualapai expect any future deviations from the work plan, will continue to incorporate Tribal concerns and Tribal participation. The Tribes state their intended interest to stay involved with any deviations from the work plan with the same level of involvement that has occurred during the drafting of the work plan. The Tribes need to be included in all alternative/additional well location discussions. This includes Hualapai presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Tribes as well as to	A similar RTC (RTC #174) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										notify Tribes of the need for particular wells.	
174	Cocopah/TRC	Non-design	Editorial	2.4.1 Land Ownership Disturbance, and Development p. 2-13	Land owners and leaseholders will have to grant permission to access their property for construction and operation of groundwater remedy facilities or equipment.	As worded it seems as though the landowner has no choice but to grant access permission. This is inconsistent with statements made previously which indicated permission for use of private land will need to be obtained from the landowner. Please confirm or reword. In addition please provide information on what access agreements to date have been obtained, and discuss in more detail what additional permissions are outstanding for use of private lands.	See above			In the case access rights are not granted to PG&E resulting in changes to the final design, The Tribes expect any future deviations from the work plan, will continue to incorporate Tribal concerns and Tribal participation. The Tribes state their intended interest to stay involved with any deviations from the work plan with the same level of involvement that has occurred during the drafting of the work plan. The Tribes need to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Tribes as well as to notify Tribes of the need for particular wells.	This RTC was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.
175	Chemehuevi/ TRC	Non-design	Editorial	2.4.1 Land Ownership Disturbance, and Development p. 2-13	Land owners and leaseholders will have to grant permission to access their property for construction and operation of groundwater remedy facilities or equipment.	As worded it seems as though the landowner has no choice but to grant access permission. This is inconsistent with statements made previously which indicated permission for use of private land will need to be obtained from the landowner. Please confirm or reword. In addition please provide information on what access agreements to date have been obtained, and discuss in more detail what additional permissions are outstanding for use of private lands.	See above			In the case access rights are not granted to PG&E resulting in changes to the final design, The Tribes expect any future deviations from the work plan, will continue to incorporate Tribal concerns and Tribal participation. The Tribes state their intended interest to stay involved with any deviations from the work plan with the same level of involvement that has	A similar RTC (RTC #174) was discussed at the August 18 TWG meeting. DTSC Response: Tribal comment noted.

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										occurred during the drafting of the work plan. The Tribes need to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources identified by Tribes as well as to notify Tribes of the need for particular wells.	
176	FMIT/TRC	Non-design	CEQA/EIR	2.4.2 Site Topography and Surface Geology p. 2-14	Surface conditions and topography have a significant effect on project implementation. For example, variation in surface elevations will require installing air release valves on pipes	Have these air release valves been addressed under the EIR for noise impacts?	The EIR addressed air release valves on pages 3-18 and 3-25.		Noted.	Noted.	
177	Hualapai/TRC	Non-design	CEQA/EIR	2.4.2 Site Topography and Surface Geology p. 2-14	Surface conditions and topography have a significant effect on project implementation. For example, variation in surface elevations will require installing air release valves on pipes	Have these air release valves been addressed under the EIR for noise impacts?	See above		See above	Noted.	
178	Cocopah/TRC	Non-design	CEQA/EIR	2.4.2 Site Topography and Surface Geology p. 2-14	Surface conditions and topography have a significant effect on project	Have these air release valves been addressed under the EIR for noise impacts?	See above		See above	Noted.	

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					implementation. For example, variation in surface elevations will require installing air release valves on pipes						
179	Chemehuevi/ TRC	Non-design	CEQA/EIR	2.4.2 Site Topography and Surface Geology p. 2-14	Surface conditions and topography have a significant effect on project implementation. For example, variation in surface elevations will require installing air release valves on pipes	Have these air release valves been addressed under the EIR for noise impacts?	See above		See above	Noted.	
180	FMIT/TRC 1c	Design	Remedial Design	2.4.3.1 Coordination of RFI/RI Soil Investigation with Remedy Design and Construction	Groundwater remedy infrastructure may be relocated to avoid the contaminated soil areas.	It is not clear the exact meaning of this as much collaborative effort on the part of Stakeholders has been involved in determining the exact location of the remedial infrastructure. This statement however appears to suggest that final locations may not be as determined within the BOD documents and will potentially be changed. If this is true how will Tribal stakeholder involvement work on the final placement of remedy structure?	Please see RTCs #44 FMIT/TRC, #45 Hualapai/ TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC, first paragraph for discussion on potential changes. Please see the rest of RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/TRC for discussion of communication with Tribes during construction. In addition, PG&E will notify and invite Tribal monitors to monitor and observe ground disturbing activities during construction in accordance with the PA, the CHPMP, and the CIMP, e.g., tribal notification prior to certain activities and Tribal monitoring/ observation of ground disturbing activities (PA Appendix B, CHPMP Section 6, CIMP section 2.10), and/or inspection of remediation facilities and staging areas (CUL-		DOI concurs with the response.	Please see response to comment FMIT/TRC RTC #44.	DTSC Response: Tribal comment noted.

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							1a-8p).				
181	Hualapai/TRC 1c	Design	Remedial Design	2.4.3.1 Coordination of RFI/RI Soil Investigation with Remedy Design and Construction	Groundwater remedy infrastructure may be relocated to avoid the contaminated soil areas.	It is not clear the exact meaning of this as much collaborative effort on the part of Stakeholders has been involved in determining the exact location of the remedial infrastructure. This statement however appears to suggest that final locations may not be as determined within the BOD documents and will potentially be changed. If this is true how will Tribal stakeholder involvement work on the final placement of remedy structure?	See above		See above	See response to comment Hualapai/ TRC RTC #83.	DTSC Response: Tribal comment noted.
182	Cocopah/TRC 1c	Design	Remedial Design	2.4.3.1 Coordination of RFI/RI Soil Investigation with Remedy Design and Construction	Groundwater remedy infrastructure may be relocated to avoid the contaminated soil areas.	It is not clear the exact meaning of this as much collaborative effort on the part of Stakeholders has been involved in determining the exact location of the remedial infrastructure. This statement however appears to suggest that final locations may not be as determined within the BOD documents and will potentially be changed. If this is true how will Tribal stakeholder involvement work on the final placement of remedy structure?	See above		See above	See response to Cocopah RTC# 84.	DTSC Response: Tribal comment noted.
183	Chemehuevi/ TRC 1c	Design	Remedial Design	2.4.3.1 Coordination of RFI/RI Soil Investigation with Remedy Design and Construction	Groundwater remedy infrastructure may be relocated to avoid the contaminated soil areas.	It is not clear the exact meaning of this as much collaborative effort on the part of Stakeholders has been involved in determining the exact location of the remedial infrastructure. This statement however appears to suggest that final locations may not be as determined within the BOD documents and will potentially be changed. If this is true how will Tribal stakeholder involvement work on the final placement of remedy structure?	See above		See above	See response to Chemehuevi/TRC RTC# 85.	DTSC Response: Tribal comment noted.
184	DTSC-48	Non-design	Other	Section 2.4.7, Special Status Species	Special Status Wildlife	Since the 2011 certified groundwater EIR, DTSC has learned of the potential presence of several special status species at or around the proposed project area. In addition to the Townsend's Big-eared Bat that is now a candidate for protection, DTSC also understands that the Ringtail Cat is also a fully protected species and has been sighted at the Station. The Ring-tail Cat should be listed under this subheading instead of an undescriptive paragraph beneath "Other Avian Species." DTSC also understands that Big Horn Sheep have been sighted near the project area as well. Please include these species in the list.	Special-status wildlife list will be revised to include: Townsend's big-eared bat, ring-tailed cat, Nelson's big horn sheep, and the Western Yellow-billed cuckoo. A subheading for 'Other Mammal Species' will be added and text will be provided to describe the status and occurrence of each at or near the site.				
185	FMIT/TRC	Non-design	CEQA/EIR	2.4.7 p. 2-17	Special-Status Species	Please update this section to include discussion of the Thompson long-eared bat	PG&E is unaware of a species called "Thompson long-eared bat," and believes the commenter may be referring to Townsend's big-eared bats. Please see RTC #184 DTSC-48.			Noted.	
186	Hualapai/TRC	Non-design	CEQA/EIR	2.4.7 p. 2-17	Special-Status Species	Please update this section to include discussion of the Thompson long-eared bat	See above			Noted.	
187	Cocopah/TRC	Non-design	CEQA/EIR	2.4.7 p. 2-17	Special-Status Species	Please update this section to include discussion of the Thompson long-eared bat	See above			Noted.	
188	Chemehuevi/ TRC	Non-design	CEQA/EIR	2.4.7 p. 2-17	Special-Status Species	Please update this section to include discussion of the Thompson long-eared bat	See above			Noted.	
189	DTSC-46	Non-design	Other	2.4.7 Special-Status Species/ Page 2-19	"An individual was observed within the Topock Compressor Station on October 25, 2007 and a second ringtail	DTSC and PG&E consultants noted the carcass of a Ringtail sometime between 2006 and 2010. It was located in Arizona underneath the railroad bridge area. This siting should be included in the document if there is sufficient documentation.	This incidental sighting by DTSC will be added as directed. While the date was not recalled, it would be helpful to document the particular, if available, regarding PG&E consultant (or firm) with whom, this	Resolved.			Comment resolved.

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					sighting was made a few years later. No other ringtail sightings have been reported in the project area before or after these occasions."		ring-tailed cat sighting was made. This would allow PG&E to better document the sighting.				
190	DTSC-47	Design	Remedial Design	2.4.7 Special-Status Species/ Page 2-19	"There have been no CNDDB desert tortoise occurrences within 15 kilometers of the PG&E Topock survey area."	Add any other occurrences of desert tortoise in the area that are available. For instance, in April 2011, DTSC noted a tortoise crossing Airport Road about 7 miles to the northwest of the site. Photographs are available if desired.	This incidental sighting by DTSC will be added. No other tortoise occurrences of desert tortoise are known by PG&E at this time.	Resolved.			Comment resolved.
191	FMIT/TRC	Non-design	CEQA/EIR	2.4.7 Special-Status Species p. 2-19	It is important to note that five years of annual protocols survey for desert tortoise were conducted in the APE from 2005 to 2009. None of these protocol surveys indicated the presence of live desert tortoises, as only aged desert tortoise remains and inactive burrows were found.	Please indicate if the survey have evaluated the presence of tortoise in the drainage for the proposed well location MW-V?	There are actually two wells labeled MV-V shown on this map. One is within BCW and the other is in the drainage to the west of BCW. This entire area was part of the original protocol-level desert tortoise surveys by GANDA.			Noted.	
192	Hualapai/TRC	Non-design	CEQA/EIR	2.4.7 Special-Status Species p. 2-19	It is important to note that five years of annual protocols survey for desert tortoise were conducted in the APE from 2005 to 2009. None of these protocol surveys indicated the presence of live desert tortoises, as	Please indicate if the survey have evaluated the presence of tortoise in the drainage for the proposed well location MW-V?	See above			Noted.	

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					only aged desert tortoise remains and inactive burrows were found.						
193	Cocopah/TRC	Non-design	CEQA/EIR	2.4.7 Special-Status Species p. 2-19	It is important to note that five years of annual protocols survey for desert tortoise were conducted in the APE from 2005 to 2009. None of these protocol surveys indicated the presence of live desert tortoises, as only aged desert tortoise remains and inactive burrows were found.	Please indicate if the survey have evaluated the presence of tortoise in the drainage for the proposed well location MW-V?	See above			Noted.	
194	Chemehuevi/ TRC	Non-design	CEQA/EIR	2.4.7 Special-Status Species p. 2-19	It is important to note that five years of annual protocols survey for desert tortoise were conducted in the APE from 2005 to 2009. None of these protocol surveys indicated the presence of live desert tortoises, as only aged desert tortoise remains and inactive burrows were found.	Please indicate if the survey have evaluated the presence of tortoise in the drainage for the proposed well location MW-V?	See above			Noted.	
195	DTSC-52	Non-design	Other	Table 2.3-1	Calculated Site Background UTLs for Groundwater	The title of this table should be revised to “Regional Background” as the background concentrations were calculated from a regional study and not site level.	Revision will be made as requested.	Resolved.			Comment resolved.
196	DTSC-49	Non-design	Editorial	Figure 2.1-1	Figure 2.1-1	The referenced figure is improperly contoured. Several groundwater well water elevations are not appropriately contoured: MW-01, MW-06, MW-08, MW-10, MW-15, MW-25, MW-59-100 and the 456.0 contour line is absent in the IM3 injection area.	The contours on the figure are from a different time period than the posted data.	Resolved.			Comment resolved.

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						A revised, properly contoured figure is required.	For the contours with correct water level data, see CH2M HILL. 2014a. Fourth Quarter 2013 and Annual Interim Measures Performance Monitoring and Site Wide Groundwater and Surface Water Monitoring Report, PG&E Topock Compressor Station, Needles, California. March 14. A revised figure was prepared in response to this comment and included in **Attachment G** of the final RTC table.				
197	DTSC-50	Non-design	Monitoring	Figure 2.1-2	Figure 2.1-2 "Approximate Extent of Saturated Alluvium."	The legend for saturated alluvium is incorrect. Revision required. Suggest either removing the legend reference for the grey area or changing it to "Approximate Extent of Saturated ~~Alluvium~~ <u>Bedrock</u>."	The symbol in the legend will be removed. The feature in question is bedrock (not saturated bedrock) and is labeled as such on the face of the figure, so no legend entry is needed for it.	Resolved.			Comment resolved.
198	DTSC-53	Non-design	CEQA/EIR	Figure 2.4-1		In addition to the 2011 certified EIR project boundary and the APE, the project boundary from the August 2013 EIR addendum for fresh water wells should also be included due to the expansion of the project into those locations. Please note, as additional areas outside of the current APE are considered for remedy use, the project area will need to be revised and fully surveyed for biological and cultural resources prior to use.	Applicable figures in the design documents will be updated to incorporate the area added pursuant to the August 2013 EIR addendum. Comment noted. The areas proposed for remedy use at Moabi Regional Park that are outside of the APE and EIR Project Area, were surveyed for biological and cultural resources. Survey results were included in the Supplemental 90% design submittal that was submitted on February 2, 2015. More recent field surveys for cultural resources were conducted in those areas and the updated information is included in the *Addendum 12: Annual Report of Archaeological and Historical Resources Investigations During 2014*. PG&E understands that adjustments to the	Okay.			Comment resolved.

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							EIR Project Area will be made by DTSC during the CEQA review of the final design. Similarly, PG&E understands that BLM will consult with the Tribes, PG&E and the California and Arizona State Historic Preservation Offices regarding any amendments to the APE, pursuant to the requirements of the PA.				
199	DOI-3	Non-design	Editorial	Figure 2.4-8	Legend: Vegetation Types, Colors and Labels	The salt cedar has a purple coloring and a label of '21' in the legend. The figure shows the salt cedar in purple, but with the label '19'. Please check.	Figure will be corrected to show Salt Cedar (19) in figure and legend and Oleander (21) deleted.		Resolved.		Comment resolved.
200	DTSC-51	Non-design	Other	Fig 2.4-10	Legend of Infrastructure and Habitat Area	The two legends are confusing. The color for proposed remedy structure and for Morafkai's Desert tortoise is too similar to distinguish in figure. Use another color or marking to separate similar colored information.	Morafkai's DETO symbol will be revised to a different color to avoid confusion.	Resolved.			Comment resolved.
Specific Comments – 90% BOD, Section 3: Design Basis and Assumptions											
201	FMIT/TRC 1d	Design	Infrastructures	3.1.4 Remediation System Design and Analysis	Potential well locations were carefully selected by first avoiding culturally or otherwise sensitive areas to minimize impact to the extent possible; delineated areas were closely evaluated, and site walks were conducted with Agencies and Tribes to review and adjust the general well locations. Precise well locations will be confirmed in the field prior to construction.	This is confusing as it was the general understanding during site walks that consultation has been conducted to determine exact infrastructure locations. This statement suggests further location adjustments will occur after the finalization of the BOD reports. Please indicate how Tribal Stakeholders will participate in these final decisions on well locations.	The intent of the text cited by the commenter is to acknowledge the site preparation and demarcation activities that will occur shortly before ground-disturbing activities, as described in C/RAWP Section 4.2.3. These activities will be conducted to field verify site conditions and sensitive resources prior to the actual ground disturbing activities, to be sure that there have not been changes in conditions since preparation of the 90% design document, or to account for changes that have taken place. These activities also include demarcating work area limits, identifying biologically and/or culturally sensitive areas, identifying subsurface utilities and other existing constraints, documenting preconstruction site conditions, and establishing access routes and work areas that will minimize		DOI concurs with the PG&E response.	Please see response to comment FMIT/TRC RTC #44.	DTSC Response: Tribal comment noted.

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							impacts to these features to the extent possible. Precise well locations will be confirmed in the field during this field verification process. Consistent with current practice, PG&E will notify the tribal stakeholders in advance of ground-disturbing activities and invite tribal monitors to observe such activities (see RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, #47 Chemehuevi/TRC #180 FMIT/TRC-1c, #181 Hualapai/TRC-1c, #182 Cocopah/TRC-1c, and #183 Chemehuevi/TRC-1c).				
202	Hualapai/TRC 1d	Design	Infrastructures	3.1.4 Remediation System Design and Analysis	Potential well locations were carefully selected by first avoiding culturally or otherwise sensitive areas to minimize impact to the extent possible; delineated areas were closely evaluated, and site walks were conducted with Agencies and Tribes to review and adjust the general well locations. Precise well locations will be confirmed in the field prior to construction.	This is confusing as it was the general understanding during site walks that consultation has been conducted to determine exact infrastructure locations. This statement suggests further location adjustments will occur after the finalization of the BOD reports. Please indicate how Tribal Stakeholders will participate in these final decisions on well locations.	See above		See above	See response tp comment Hualapai /TRC RTC #83.	DTSC Response: Tribal comment noted.
203	Cocopah/TRC 1d	Design	Infrastructures	3.1.4 Remediation System Design and Analysis	Potential well locations were carefully selected by first avoiding culturally or otherwise sensitive areas to minimize	This is confusing as it was the general understanding during site walks that consultation has been conducted to determine exact infrastructure locations. This statement suggests further location adjustments will occur after the finalization of the BOD reports. Please indicate how Tribal Stakeholders will participate in these final decisions on well locations.	See above		See above	See response to Cocopah RTC# 84.	DTSC Response: Tribal comment noted.

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					impact to the extent possible; delineated areas were closely evaluated, and site walks were conducted with Agencies and Tribes to review and adjust the general well locations. Precise well locations will be confirmed in the field prior to construction.						
204	Chemehuevi/ TRC 1d	Design	Infrastructures	3.1.4 Remediation System Design and Analysis	Potential well locations were carefully selected by first avoiding culturally or otherwise sensitive areas to minimize impact to the extent possible; delineated areas were closely evaluated, and site walks were conducted with Agencies and Tribes to review and adjust the general well locations. Precise well locations will be confirmed in the field prior to construction.	This is confusing as it was the general understanding during site walks that consultation has been conducted to determine exact infrastructure locations. This statement suggests further location adjustments will occur after the finalization of the BOD reports. Please indicate how Tribal Stakeholders will participate in these final decisions on well locations.	See above		See above	See Chemehuevi/TRC RTC #85.	DTSC Response: Tribal comment noted.
205	FMIT/TRC RTC, 60% #360	Non-design	GW Modeling	3.1.5 p. 3-4	(orig comment #360 response)....*The groundwater flow and solute transport model will be updated and recalibrated if significant differences from the conceptual site*	Although there is general discussion to update the model in the 90% BOD, it is stated that it will be *"updated annually if the data collected suggest that updates are needed"* [emphasis added] during the well installation/drilling phase. Updating of the model during this data collection phase is critical. This is important to the Tribes as having an updated, working model will be an important predictive tool to ensure this system is installed and operated in a proactive process. Every effort should be made to avoid "surprises" during the initial operational phase of this system. As there is a high probability that in reacting to unanticipated results (crisis mode), Tribal cultural values will be more likely to be pushed aside in lieu of solving an immediate, technical issue.	The following statements from the model update procedure will be removed to reduce the uncertainty of the timing of model updates: "if the data collected suggest that updates are needed" and "if significant differences from the conceptual site model are encountered".			Comment noted.	DTSC Response: Tribal comment noted.

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					model are encountered with respect to hydrogeologic characterization or remedy performance. This will allow the model to be used as a tool to evaluate the performance and guide the operation of the remedial design after including the adjusted data		Instead the model update procedure will adhere to the proposed update schedule presented in Appendix B Section 12 independent of the degree of variability between observed data and the model.				
206	Hualapai/TRC RTC, 60% #360	Non-design	GW Modeling	3.1.5 p. 3-4	(orig comment #360 response)....*The groundwater flow and solute transport model will be updated and recalibrated if significant differences from the conceptual site model are encountered with respect to hydrogeologic characterization or remedy performance. This will allow the model to be used as a tool to evaluate the performance and guide the operation of the remedial design after including the adjusted data*	Although there is general discussion to update the model in the 90% BOD, it is stated that it will be *"updated annually if the data collected suggest that updates are needed"* [emphasis added] during the well installation/drilling phase. Updating of the model during this data collection phase is critical. This is important to the Tribes as having an updated, working model will be an important predictive tool to ensure this system is installed and operated in a proactive process. Every effort should be made to avoid "surprises" during the initial operational phase of this system. As there is a high probability that in reacting to unanticipated results (crisis mode), Tribal cultural values will be more likely to be pushed aside in lieu of solving an immediate, technical issue.	See above			Comment noted.	DTSC Response: Tribal comment noted.
207	Cocopah/TRC RTC, 60% #360	Non-design	GW Modeling	3.1.5 p. 3-4	(orig comment #360 response)....*The groundwater flow and solute transport model will be updated and recalibrated if significant differences from the conceptual site*	Although there is general discussion to update the model in the 90% BOD, it is stated that it will be *"updated annually if the data collected suggest that updates are needed"* [emphasis added] during the well installation/drilling phase. Updating of the model during this data collection phase is critical. This is important to the Tribes as having an updated, working model will be an important predictive tool to ensure this system is installed and operated in a proactive process. Every effort should be made to avoid "surprises" during the initial operational phase of this system. As there is a high probability that in reacting to unanticipated results (crisis mode), Tribal cultural values will be more likely to be pushed aside in lieu of solving an immediate, technical issue.	See above			Comment noted.	DTSC Response: Tribal comment noted.

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					model are encountered with respect to hydrogeologic characterization or remedy performance. This will allow the model to be used as a tool to evaluate the performance and guide the operation of the remedial design after including the adjusted data						
208	Chemehuevi/ TRC RTC, 60% #360	Non-design	GW Modeling	3.1.5 p. 3-4	(orig comment #360 response)....*The groundwater flow and solute transport model will be updated and recalibrated if significant differences from the conceptual site model are encountered with respect to hydrogeologic characterization or remedy performance. This will allow the model to be used as a tool to evaluate the performance and guide the operation of the remedial design after including the adjusted data*	Although there is general discussion to update the model in the 90% BOD, it is stated that it will be *"updated annually if the data collected suggest that updates are needed"* [emphasis added] during the well installation/drilling phase. Updating of the model during this data collection phase is critical. This is important to the Tribes as having an updated, working model will be an important predictive tool to ensure this system is installed and operated in a proactive process. Every effort should be made to avoid "surprises" during the initial operational phase of this system. As there is a high probability that in reacting to unanticipated results (crisis mode), Tribal cultural values will be more likely to be pushed aside in lieu of solving an immediate, technical issue.	See above			Comment noted.	DTSC Response: Tribal comment noted.
209	DTSC-54	Design	GW Modeling	3.1.5 Model Update Procedures/ Page 3-5, and section 3.1.5.1	"If there are significant differences, the groundwater flow model, geochemical model, and/or the solute transport model will be updated and recalibrated."	As described here in the cited sentences, model updates will be performed if there are "significant differences" or if "if the data collected suggest that updates are needed". Please define "significant differences" and "if data collected suggest…" DTSC agrees that annual update of flow and solute transport model is appropriate. It is preferable to calibrate the model periodically with measured data to confirm its accuracy and predictions than a subjective decision that it is needed. Update based on subjective "significant differences" is not appropriate. Currently, the predicted remedy duration, by-product generation and plume capture relies heavily on model predictions. PG&E should provide a table with strategy on timing of model verification and recalibration. The section (or references to other sections) should describe as best as possible what would trigger an actual model update.	See RTC #205 FMIT/TRC, #206 Hualapai/TRC, #207 Cocopah/TRC, and #208 Chemehuevi/ TRC.				

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					"During the remedy well construction and testing period, the groundwater flow and solute transport model will be updated annually if the data collected suggest that updates are needed;…" 3.1.5.1 ""…if data collected suggest that updates are needed…"						
210	FMIT/TRC RTC, 60% #359	Non-design	GW Modeling	3.1.1/3-1 and 3.1.5/3-4	Use of PEST to reduce uncertainty	The information provided gave further context to the use of PEST in the model development. However, given the long term, high-quality water level data, associated trends in well CrVI concentrations and operational data associated with the IM3 system, PEST should be used to further calibrate key flow and fate/transport model parameters to reduce uncertainty in a key area of the proposed remedial system (i.e., high concentrations nearest river). Doing so now could provide a) greater credibility in modeling results, and b) greater sense that proposed new wells and associated operations are optimal for system performance to meet RAOs/OPS determination.	It is proposed that the model will be updated and recalibrated as per the schedule described in the model update procedure (Appendix B Section 12). Recent hydraulic data and groundwater quality data have been used to update the groundwater flow model and refine the geochemical and solute transport model parameters. The proposed remedy design is not solely based on modeling and additional calibration prior to remedy design implementation would not likely alter the selected remedy approach. PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			We continue to believe it is in the best interest of all Stakeholders, including PG&E, to fix noted deficiencies in the model in a timely manner (i.e., see Prucha and Eggers, July 2015 whitepaper). The model would then be re-calibrated to existing flow and fate/transport data associated with the broader IM-3 area (as opposed to local-scale tests used to calibrate some parameters), as this is a key area of the proposed remediation. At a minimum, the existing model should be validated (standard modeling protocol) against IM-3 flow and fate/transport data now to demonstrate that proposed remediation system design and operation are able to reproduce changes in a key remediation area. This would provide greater transparency and more confidence that the existing model (despite noted flaws) does not need to be updated until after construction of the entire system.	DTSC/DOI Response: See RTC #17

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211	Hualapai/TRC RTC, 60% #359	Non-design	GW Modeling	3.1.1/3-1 and 3.1.5/3-4	Use of PEST to reduce uncertainty	The information provided gave further context to the use of PEST in the model development. However, given the long term, high-quality water level data, associated trends in well CrVI concentrations and operational data associated with the IM3 system, PEST should be used to further calibrate key flow and fate/transport model parameters to reduce uncertainty in a key area of the proposed remedial system (i.e., high concentrations nearest river). Doing so now could provide a) greater credibility in modeling results, and b) greater sense that proposed new wells and associated operations are optimal for system performance to meet RAOs/OPS determination.	See above			We continue to believe it is in the best interest of all Stakeholders, including PG&E, to fix noted deficiencies in the model in a timely manner (i.e., see Prucha and Eggers, July 2015 whitepaper). The model would then be re-calibrated to existing flow and fate/transport data associated with the broader IM-3 area (as opposed to local-scale tests used to calibrate some parameters), as this is a key area of the proposed remediation. At a minimum, the existing model should be validated (standard modeling protocol) against IM-3 flow and fate/transport data now to demonstrate that proposed remediation system design and operation are able to reproduce changes in a key remediation area. This would provide greater transparency and more confidence that the existing model (despite noted flaws) does not need to be updated until after construction of the entire system.	DTSC/DOI Response: See RTC #17
212	Cocopah/TRC RTC, 60% #359	Non-design	GW Modeling	3.1.1/3-1 and 3.1.5/3-4	Use of PEST to reduce uncertainty	The information provided gave further context to the use of PEST in the model development. However, given the long term, high-quality water level data, associated trends in well CrVI concentrations and operational data associated with the IM3 system, PEST should be used to further calibrate key flow and fate/transport model parameters to reduce uncertainty in a key area of the proposed remedial system (i.e., high concentrations nearest river). Doing so now could provide a) greater credibility in modeling results, and b) greater sense that proposed new wells and associated operations are optimal for system performance to meet RAOs/OPS determination.	See above			We continue to believe it is in the best interest of all Stakeholders, including PG&E, to fix noted deficiencies in the model in a timely manner (i.e., see Prucha and Eggers, July 2015 whitepaper). The model would then be re-calibrated to existing flow and fate/transport data associated with the broader IM-3 area (as opposed to local-scale tests used to calibrate some parameters), as this is a key area of the proposed remediation. At a minimum, the	DTSC/DOI Response: See RTC #17

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										existing model should be validated (standard modeling protocol) against IM-3 flow and fate/transport data now to demonstrate that proposed remediation system design and operation are able to reproduce changes in a key remediation area. This would provide greater transparency and more confidence that the existing model (despite noted flaws) does not need to be updated until after construction of the entire system.	
213	Chemehuevi/ TRC RTC, 60% #359	Non-design	GW Modeling	3.1.1/3-1 and 3.1.5/3-4	Use of PEST to reduce uncertainty	The information provided gave further context to the use of PEST in the model development. However, given the long term, high-quality water level data, associated trends in well CrVI concentrations and operational data associated with the IM3 system, PEST should be used to further calibrate key flow and fate/transport model parameters to reduce uncertainty in a key area of the proposed remedial system (i.e., high concentrations nearest river). Doing so now could provide a) greater credibility in modeling results, and b) greater sense that proposed new wells and associated operations are optimal for system performance to meet RAOs/OPS determination.	See above			We continue to believe it is in the best interest of all Stakeholders, including PG&E, to fix noted deficiencies in the model in a timely manner (i.e., see Prucha and Eggers, July 2015 whitepaper). The model would then be re-calibrated to existing flow and fate/transport data associated with the broader IM-3 area (as opposed to local-scale tests used to calibrate some parameters), as this is a key area of the proposed remediation. At a minimum, the existing model should be validated (standard modeling protocol) against IM-3 flow and fate/transport data now to demonstrate that proposed remediation system design and operation are able to reproduce changes in a key remediation area. This would provide greater transparency and more confidence that the existing model (despite noted flaws) does not need to be updated until after construction of the entire system.	DTSC/DOI Response: See RTC #17
214	FMIT/TRC	Non-design	GW Modeling	3.2.1/ P. 3-7	"EXHIBIT 3.2-1	The 90% BOD documents indicate design/operation of the proposed remedial system is flexible	The pre-final range of			This was understood.	PG&E Response:

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					NATIONAL TRAILS HIGHWAY IN-SITU REACTIVE ZONE (NTH IRZ) ENGINEERING DESIGN ELEMENTS AND FEATURES Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design PG&E Topock Compressor Station, Needles, California"	enough to accommodate all uncertainty in model inputs. To give Tribes a better sense that the 'optimized' system injection/extraction rates/locations etc. are indeed flexible enough to accommodate the significant uncertainty in model inputs/ conceptualization of flow, fate and transport etc. – can a range of maximum/minimum possible injection/extraction rates be provided here for each well rather than the range presented? This is important because additional wells might not be required if additional pumping capacity exists at initial remedial wells, beyond the somewhat loosely defined operational range presented here. This becomes even more relevant given the proposed hydraulic testing which is limited to only a few select wells and not necessarily aimed at determining maximum pumping capacities for each and every injection well.	minimum/ nominal/ maximum injection/ extraction rates on a well-by-well basis are presented in Table 3.2-1 of the BOD document.			However, Table 3.2-1 presents what appears to be prescribed values for minimum/maximum rates that were not fully determined through modeling or other rationale. What are the actual min/max possible ranges at each well rather than the desired ranges. Another way to ask this is, could the min/max ranges provided in Table 3.2-1 actually be extended, thereby potentially limiting the need for new wells? Please describe exactly how min/max ranges were defined for each well. It is our understanding that true evaluation of max/min possible rates at each well were never really assessed via modeling, or any other method. This becomes especially important in wells such as riverbank extraction, which would affect potential movement into Arizona groundwater.	Minimum and maximum well injection and extraction rates were estimates through assessment of available hydrogeologic data, current observed operational rates, and modeling. Actual minimum and maximum rates can only be fully determined after well construction through system operation or field testing. DTSC/DOI Response: Tribal comment and PG&E's response noted.
215	Hualapai/TRC	Non-design	GW Modeling	3.2.1/ P. 3-7	"EXHIBIT 3.2-1 NATIONAL TRAILS HIGHWAY IN-SITU REACTIVE ZONE (NTH IRZ) ENGINEERING DESIGN ELEMENTS AND FEATURES Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design PG&E Topock Compressor Station, Needles, California"	The 90% BOD documents indicate design/operation of the proposed remedial system is flexible enough to accommodate all uncertainty in model inputs. To give Tribes a better sense that the 'optimized' system injection/extraction rates/locations etc. are indeed flexible enough to accommodate the significant uncertainty in model inputs/ conceptualization of flow, fate and transport etc. – can a range of maximum/minimum possible injection/extraction rates be provided here for each well rather than the range presented? This is important because additional wells might not be required if additional pumping capacity exists at initial remedial wells, beyond the somewhat loosely defined operational range presented here. This becomes even more relevant given the proposed hydraulic testing which is limited to only a few select wells and not necessarily aimed at determining maximum pumping capacities for each and every injection well.	See above			This was understood. However, Table 3.2-1 presents what appears to be prescribed values for minimum/maximum rates that were not fully determined through modeling or other rationale. What are the actual min/max possible ranges at each well rather than the desired ranges. Another way to ask this is, could the min/max ranges provided in Table 3.2-1 actually be extended, thereby potentially limiting the need for new wells? Please describe exactly how min/max ranges were defined for each well. It is our understanding that true evaluation of	DTSC Response: See RTC #214

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										max/min possible rates at each well were never really assessed via modeling, or any other method. This becomes especially important in wells such as riverbank extraction, which would affect potential movement into Arizona groundwater.	
216	Cocopah/TRC	Non-design	GW Modeling	3.2.1/ P. 3-7	"EXHIBIT 3.2-1 NATIONAL TRAILS HIGHWAY IN-SITU REACTIVE ZONE (NTH IRZ) ENGINEERING DESIGN ELEMENTS AND FEATURES Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design PG&E Topock Compressor Station, Needles, California"	The 90% BOD documents indicate design/operation of the proposed remedial system is flexible enough to accommodate all uncertainty in model inputs. To give Tribes a better sense that the 'optimized' system injection/extraction rates/locations etc. are indeed flexible enough to accommodate the significant uncertainty in model inputs/ conceptualization of flow, fate and transport etc. – can a range of maximum/minimum possible injection/extraction rates be provided here for each well rather than the range presented? This is important because additional wells might not be required if additional pumping capacity exists at initial remedial wells, beyond the somewhat loosely defined operational range presented here. This becomes even more relevant given the proposed hydraulic testing which is limited to only a few select wells and not necessarily aimed at determining maximum pumping capacities for each and every injection well.	See above			This was understood. However, Table 3.2-1 presents what appears to be prescribed values for minimum/maximum rates that were not fully determined through modeling or other rationale. What are the actual min/max possible ranges at each well rather than the desired ranges. Another way to ask this is, could the min/max ranges provided in Table 3.2-1 actually be extended, thereby potentially limiting the need for new wells? Please describe exactly how min/max ranges were defined for each well. It is our understanding that true evaluation of max/min possible rates at each well were never really assessed via modeling, or any other method. This becomes especially important in wells such as riverbank extraction, which would affect potential movement into Arizona groundwater.	DTSC Response: See RTC #214
217	Chemehuevi/ TRC	Non-design	GW Modeling	3.2.1/ P. 3-7	"EXHIBIT 3.2-1 NATIONAL TRAILS HIGHWAY IN-SITU REACTIVE ZONE (NTH IRZ) ENGINEERING DESIGN ELEMENTS AND FEATURES Groundwater Remedy Basis of Design Report/Pre-	The 90% BOD documents indicate design/operation of the proposed remedial system is flexible enough to accommodate all uncertainty in model inputs. To give Tribes a better sense that the 'optimized' system injection/extraction rates/locations etc. are indeed flexible enough to accommodate the significant uncertainty in model inputs/ conceptualization of flow, fate and transport etc. – can a range of maximum/minimum possible injection/extraction rates be provided here for each well rather than the range presented? This is important because additional wells might not be required if additional pumping capacity exists at initial remedial wells, beyond the somewhat loosely defined operational range presented here. This becomes even more relevant given the proposed hydraulic testing which is limited to only a few select wells and not necessarily aimed at determining maximum pumping capacities for each and every injection well.	See above			This was understood. However, Table 3.2-1 presents what appears to be prescribed values for minimum/maximum rates that were not fully determined through modeling or other rationale. What are the actual min/max possible ranges at each well rather than the desired ranges? Another way to ask this	DTSC Response: See RTC #214

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					Final (90%) Design PG&E Topock Compressor Station, Needles, California”					is, could the min/max ranges provided in Table 3.2-1 actually be extended, thereby potentially limiting the need for new wells? Please describe exactly how min/max ranges were defined for each well. It is our understanding that true evaluation of max/min possible rates at each well were never really accessed via modeling, or any other method. This becomes especially important in wells such as riverbank extraction, which would affect potential movement into Arizona groundwater.	
218	FMIT/TRC 1e	Non-design	Monitoring	3.2.1 National Trails Highway In-Situ Reactive Zone (NTH IRZ)	One provisional extraction well (IRZ-40) and up to 30 provisional injection wells situated within 19 locations within the NTH IRZ (see Figure 3.0-1Figure ES-4A) may also be installed and activated dependent on the monitored performance of the NTH IRZ over time, and flexibility will be retained to adjust the locations of provisional wells in the future as the remedial program evolves; provisional well locations will be discussed with the stakeholders prior to implementation; criteria for installation and activation	Please provide additional detail on how Tribal stakeholders will be involved in the final decisions on well locations. In addition will Tribes have an opportunity to review and provide comment on data analysis that is used in determining the need for provisional wells and final well locations?	Please see RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/TRC for discussion of communication with Tribes during construction, startup, and O&M. In addition, PG&E will notify and invite Tribal monitors to monitor and observe ground disturbing activities in accordance with the PA, the CHPMP, and the CIMP, e.g., tribal notification prior to certain activities and Tribal monitoring/ observation of ground disturbing activities (PA Appendix B, CHPMP Section 6, and CIMP section 2.10).			Please see response to comment FMIT/TRC RTC #44.	DTSC Response: Tribal comment noted.

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					of the provisional wells are provided in Appendix L, the O&M Manual, Volume 2, Section 2.2.1						
219	Hualapai/TRC 1e	Non-design	Monitoring	3.2.1 National Trails Highway In-Situ Reactive Zone (NTH IRZ)	One provisional extraction well (IRZ-40) and up to 30 provisional injection wells situated within 19 locations within the NTH IRZ (see Figure 3.0-1Figure ES-4A) may also be installed and activated dependent on the monitored performance of the NTH IRZ over time, and flexibility will be retained to adjust the locations of provisional wells in the future as the remedial program evolves; provisional well locations will be discussed with the stakeholders prior to implementation; criteria for installation and activation of the provisional wells are provided in Appendix L, the O&M Manual, Volume 2, Section 2.2.1	Please provide additional detail on how Tribal stakeholders will be involved in the final decisions on well locations. In addition will Tribes have an opportunity to review and provide comment on data analysis that is used in determining the need for provisional wells and final well locations?	See above			See response to comment Hualapai/TRC RTC #83.	DTSC Response: Tribal comment noted.
220	Cocopah/TRC 1e	Non-design	Monitoring	3.2.1 National Trails Highway In-Situ Reactive Zone (NTH IRZ)	One provisional extraction well (IRZ-40) and up to 30 provisional injection wells situated within	Please provide additional detail on how Tribal stakeholders will be involved in the final decisions on well locations. In addition will Tribes have an opportunity to review and provide comment on data analysis that is used in determining the need for provisional wells and final well locations?	See above			See response to Cocopah RTC#84.	DTSC Response: Tribal comment noted.

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					19 locations within the NTH IRZ (see Figure 3.0-1Figure ES-4A) may also be installed and activated dependent on the monitored performance of the NTH IRZ over time, and flexibility will be retained to adjust the locations of provisional wells in the future as the remedial program evolves; provisional well locations will be discussed with the stakeholders prior to implementation; criteria for installation and activation of the provisional wells are provided in Appendix L, the O&M Manual, Volume 2, Section 2.2.1						
221	Chemehuevi/ TRC 1e	Non-design	Monitoring	3.2.1 National Trails Highway In-Situ Reactive Zone (NTH IRZ)	One provisional extraction well (IRZ-40) and up to 30 provisional injection wells situated within 19 locations within the NTH IRZ (see Figure 3.0-1Figure ES-4A) may also be installed and activated dependent on the monitored performance of the NTH IRZ over time, and flexibility will be retained to adjust the	Please provide additional detail on how Tribal stakeholders will be involved in the final decisions on well locations. In addition will Tribes have an opportunity to review and provide comment on data analysis that is used in determining the need for provisional wells and final well locations?	See above			See Chemehuevi/TRC RTC #85.	DTSC response: Tribal comment noted.

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					locations of provisional wells in the future as the remedial program evolves; provisional well locations will be discussed with the stakeholders prior to implementation; criteria for installation and activation of the provisional wells are provided in Appendix L, the O&M Manual, Volume 2, Section 2.2.1						
222	DTSC-55	Non-design	Editorial	Section 3.2.1.1, Description of NTH IRZ, page 3-8 1st paragraph	i.e., the threshold optimization criterion of minimizing the Cr[VI] remedial timeframe has been met; see also section 3.1.4).	This statement seems out of place. The preceding statement asserts that the spacing of the NTH IRZ line will minimize the potential for the extraction of carbon substrate or treated water. How does that, by itself, fulfill the criterion to minimize the remedial timeframe? Please clarify or remove the referenced sentence.	The intent of the statement was to tie the NTH IRZ-specific optimization criteria to the threshold optimization criteria summarized in Section 3.1.4 and detailed in Appendix B (Section 6.4 and Table 6.4-1). The referenced text will be revised as follows to clarify: "Based on the results of groundwater flow and solute transport modeling, the current recirculation system configuration—injection wells spaced along the NTH IRZ line with extraction wells located at the ends and in the central portion of the NTH IRZ—will allow for adequate lateral dispersion of organic carbon while minimizing the potential for the extraction of carbon substrate or treated water ~~(i.e., the threshold optimization criterion of minimizing the Cr[VI] remedial timeframe has been met; see also~~	Resolved.			Comment resolved.

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							~~Section 3.1.4~~). Adequate lateral dispersion of organic carbon prevents breakthrough of the Cr(VI) plume that, if allowed, may in turn lead to an extended remedial timeframe; thus, the threshold optimization criterion of minimizing the Cr(VI) remedial timeframe has been met through model assessment of the NTH IRZ well spacing.”				
223	FMIT/TRC	Design	CEQA/EIR	3.2.1.1 Description of NTH IRZ - Portable Tanks. p. 3-11	The NTH IRZ Injection Well design will include manual addition ports to accommodate the potential use of portable tanks (5- to 1,000-gallon capacity) for the direct injection of dilute carbon substrate solution at the wellheads. Portable tanks may be preferred over pipelines at locations where the carbon injection volume is low, injections occur with long rest periods, or long pipelines are expected to pose health and safety and/or long term O&M challenges.	Please describe how the presence of portable tanks at well heads was addressed within the groundwater EIR. Please provide an image of what this will look like so Tribes can see how the visual landscape would be affected?	Photograph of a typical 500 to 1,000 gallon portable tank that would be pulled on a small trailer by a pickup is included in **Attachment H** of the final RTC table. See 60% RTC #96a for reference to how the FEIR addressed portable tanks.	Portable tanks were considered in the 2011 FEIR. DTSC will evaluate if additional discussion is warranted in the SEIR associated with this activities.		It is the opinion of the Tribe that portable tanks specifically used at the NTH IRZ Injection wells must be addressed within the SEIR in regards to impacts on both the Cultural and Visual resources.	DTSC response: See DTSC’s original response. Tribal comment noted.
224	Hualapai/TRC	Design	CEQA/EIR	3.2.1.1 Description of NTH IRZ - Portable Tanks. p. 3-11	The NTH IRZ Injection Well design will include manual addition ports to accommodate the potential use of portable tanks (5- to	Please describe how the presence of portable tanks at well heads was addressed within the groundwater EIR. Please provide an image of what this will look like so Tribes can see how the visual landscape would be affected?	See above			It is the opinion of the Hualapai that portable tanks specifically used at the NTH IRZ Injection wells were not adequately addressed in the 2011 FEIR and needs to be addressed within the SEIR in regards to impacts on	DTSC response: See DTSC’s original response to RTC #223. Tribal comment noted.

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					1,000-gallon capacity) for the direct injection of dilute carbon substrate solution at the wellheads. Portable tanks may be preferred over pipelines at locations where the carbon injection volume is low, injections occur with long rest periods, or long pipelines are expected to pose health and safety and/or long term O&M challenges.					both the Cultural and Visual resources.	
225	Cocopah/TRC	Design	CEQA/EIR	3.2.1.1 Description of NTH IRZ - Portable Tanks. p. 3-11	The NTH IRZ Injection Well design will include manual addition ports to accommodate the potential use of portable tanks (5- to 1,000-gallon capacity) for the direct injection of dilute carbon substrate solution at the wellheads. Portable tanks may be preferred over pipelines at locations where the carbon injection volume is low, injections occur with long rest periods, or long pipelines are expected to pose health and safety and/or long	Please describe how the presence of portable tanks at well heads was addressed within the groundwater EIR. Please provide an image of what this will look like so Tribes can see how the visual landscape would be affected?	See above			It is the opinion of the Tribes that portable tanks specifically used at the NTH IRZ Injection wells was not adequately addressed in the 2011 FEIR and needs to be addressed within the SEIR in regards to impacts on both the Cultural and Visual resources.	DTSC response: See DTSC's original response to RTC #223. Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					term O&M challenges.						
226	Chemehuevi/ TRC	Design	CEQA/EIR	3.2.1.1 Description of NTH IRZ - Portable Tanks. p. 3-11	The NTH IRZ Injection Well design will include manual addition ports to accommodate the potential use of portable tanks (5- to 1,000-gallon capacity) for the direct injection of dilute carbon substrate solution at the wellheads. Portable tanks may be preferred over pipelines at locations where the carbon injection volume is low, injections occur with long rest periods, or long pipelines are expected to pose health and safety and/or long term O&M challenges.	Please describe how the presence of portable tanks at well heads was addressed within the groundwater EIR. Please provide an image of what this will look like so Tribes can see how the visual landscape would be affected?	See above			It is the opinion of the Tribes that portable tanks specifically used at the NTH IRZ Injection wells was not adequately addressed in the 2011 FEIR and needs to be addressed within the SEIR in regards to impacts on both the Cultural and Visual resources.	DTSC response: See DTSC's original response to RTC #223. Tribal comment noted.
227	FMIT/TRC	Non-design	Remedial Design	3.2.1.1 p. 3-13 Description of NTH IRZ Well Maintenance and Rehabilitation Reagents	The biological dispersant is not expected to impact groundwater chemistry or the reducing environment of the IRZ during rehabilitation.	Please provide detail on how the zero impact conclusion was determined, (i.e. what is the reference for this conclusion?)	The use of Nu-Well 310 Bioacid Polymer is not expected to impact groundwater chemistry or the reducing environment of the IRZ during rehabilitation. The product is NSF approved for cleaning potable water wells, pipelines and filter systems. As part of the well rehabilitation process, the majority of the water containing the added well chemicals is removed during purging of the wells. Any remaining Nu-Well 310 decomposes into carbon monoxide, carbon dioxide with extremely small amounts of			Noted.	

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							phosphorus compounds.				
228	Hualapai/TRC	Non-design	Remedial Design	3.2.1.1 p. 3-13 Description of NTH IRZ Well Maintenance and Rehabilitation Reagents	The biological dispersant is not expected to impact groundwater chemistry or the reducing environment of the IRZ during rehabilitation.	Please provide detail on how the zero impact conclusion was determined, (i.e. what is the reference for this conclusion?)	See above			Noted.	
229	Cocopah/TRC	Non-design	Remedial Design	3.2.1.1 p. 3-13 Description of NTH IRZ Well Maintenance and Rehabilitation Reagents	The biological dispersant is not expected to impact groundwater chemistry or the reducing environment of the IRZ during rehabilitation.	Please provide detail on how the zero impact conclusion was determined, (i.e. what is the reference for this conclusion?)	See above			Noted.	
230	Chemehuevi/ TRC	Non-design	Remedial Design	3.2.1.1 p. 3-13 Description of NTH IRZ Well Maintenance and Rehabilitation Reagents	The biological dispersant is not expected to impact groundwater chemistry or the reducing environment of the IRZ during rehabilitation.	Please provide detail on how the zero impact conclusion was determined, (i.e. what is the reference for this conclusion?)	See above			Noted.	
231	DTSC-56	Design	Infrastructures	Section 3.2.1.3, Uncertainties and Assumptions	"…adjustments to injection or extraction locations…"	Please clarify if this implies PG&E will exchange wells from injection to extraction, or changing well locations altogether? If infrastructure locations are changed, what would be the deciding factors to assist in that determination (i.e. why move a location and why would another location be better)?	There are several ways in which injection and extraction locations may be changed to optimize organic carbon distribution and Cr(VI) treatment. Future provisional well locations may be installed. Locations that are not operating may be turned on, or locations that are operating may be turned off. Extraction wells (e.g., IRZ-23) could be turned into injection wells, although this is not likely. Note it is also unlikely that previously used injection wells will be converted into extraction wells. We have found that injection for a period of time into a given well makes it difficult for that well to be used for extraction, i.e., the well dewaters.	Resolved.			Comment resolved.

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							Infrastructure location changes may be triggered if the current locations are not sufficient to achieve carbon distribution as detailed in Appendix L, Volume 2, Section 2.2.				
232	DTSC-57	Design	Editorial	3.2.2 Inner Recirculation Loop/ Page 3-15	"…and (3) provide secondary protection for the Colorado River by controlling the migration of potential byproducts generated by the NTH IRZ."	Revise the cited sentence as follows as to better capture the intent of the loop for protection of both groundwater and surface water: "…and (3) ~~provide secondary protection for the Colorado River by~~ controll~~ling~~ the migration of potential byproducts generated by the NTH IRZ."	The sentence will be revised as suggested. The same language used in other sections of the document will also be revised accordingly.	Resolved.			Comment resolved.
233	DTSC-58	Design	Remedial design	3.2.2 Inner Recirculation Loop/ Page 3-15	"Up to four provisional River Bank Extraction Wells (RB-6 through RB-9, to be located within the approximate area shown in Figure ES-4A)…"	Revise Figure ES-4A to allow, if needed, installation of provisional River Bank Extraction Wells to areas south of the I-40. This is requested to control potential migration of the chromium or byproducts downgradient of the southern IRZ. This concept had been requested during the 60%.	The "Area for River Bank Extraction Wells (RB-6 to RB-9)", as shown on Figure ES-4A, will not be revised per the comment as that portion of this area that can be practicably used to construct a well is severely limited by the actual area of dry land. A portion of this area is wetland with the degree of saturation varying by river stage. As discussed in PG&E's 60% RTC #100 DTSC-27, it is PG&E's opinion that it is unlikely that installing a well to the south of RB-5 would provide significant benefit because the saturated thickness of the unconsolidated aquifer decreases as the bedrock contact is approached in this direction. In addition, it should be noted that there may not be much saturated thickness above the bedrock and below the reducing rind in this southern area of the river bank. Nonetheless, in response to 60% comment, a contingency has been included in Table 2.1-1 of the	To clarify, DTSC is concerned with controlling potential migration of chromium or byproducts downgradient of the southern IRZ south of RB-5. As discussed in the 60% RTC #99 DTSC-26, DTSC is concerned that a contingency may not exist to capture/mitigate potential eastbound byproducts or chromium south of RB-5 towards bedrock (e.g., MW-23). DTSC notes that several roads/ routes currently exist in this specific area and is not mandating that contingency extraction wells would have to necessarily be placed along the river's edge. Resolved.			Comment resolved. DTSC response: Aside from ability to install additional contingency extraction well to control potential migration of chromium or byproducts, PG&E must consider the installation of the River Bank extraction wells during the earlier part of the construction phase. The River Bank extraction wells are important safeguards against unexpected mobilization of contaminants, and should be in place for use shortly after initialization of IRZ injection, if needed.

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							Contingency Plan (O&M Manual Volume 3) to install additional wells, including wells south of RB-5, to control potential migration of the chromium or byproducts.				
234	FMIT/TRC	Design	Remedial Design	3.2.2.1 p. 3-16 Description River Bank Extraction Wells	Four of the River Bank Extraction Wells (shown on Figure ES-4A) are planned to be operated initially, although flexibility will be provided to operate any and all River Bank Extraction Wells at any given time based on the need to control potential migration of Cr(VI) located down gradient of the NTH IRZ, control byproduct migration	Specific to the control of potential migration of byproduct migration with the use of river bank extraction wells, please indicate where in the 90% BOD detailed discussions are included pertaining to the method used to remove byproducts from extracted/recirculated water. The information provided on the DMRS is not sufficient to evaluate the efficacy of the design.	The remedy will be operated to control byproduct generation at the NTH IRZ and to control migration across the floodplain that may necessitate extraction at the Riverbank. The process for controlling byproduct generation at the NTH IRZ is discussed in Appendix L, O&M Manual Volume 2, the Sampling and Monitoring Plan, Section 2.2.1 under NTH IRZ DQO-3. Per the comment clarification meeting held on April 23, 2015, the commenter is asking where the detailed information on the DMRS is located. PG&E's response to the clarified comment is the DMRS is a contingency system to address manganese and low pH in remedy-produced water in response to Tribes' comment (60% RTC #341). The system design basis including influent water quality, treatment goals, design flowrate, technology, footprint, and sustainability factors are presented in Appendix A of the Contingency Plan, O&M Manual Vol. 3.			The Dissolved Metal Removal System (DMRS) contingency plan was presented in response to concerns regarding the possible effects of remedy byproducts on groundwater pH, integrity of the organic rind, and the quality of the Colorado River. However, there were few discussions regarding possible scenarios where there could be endangerment to the rind and river. We are uncertain what the DMRS proposes to accomplish, except that a large capacity treatment system to treat high manganese or arsenic concentrations would be no different than a classic pump-and-treat system. If this is the case, then the pump-and-treat system should be employed from the beginning. Otherwise, more discussions are needed regarding the possible scenarios that could endanger the river, and what could be done about it. For example, rather than pump-and-treat, how about chemical stabilization of the byproduct plume using reagents? Response unresolved pending further design scenarios and contingency plans.	DTSC Response: The DMRS is PG&E's proposal to manage pH and other scaling compounds that may be present during system maintenance. DTSC is accepting the contingent design for the purpose of CEQA evaluation. PG&E must decide if the DMRS will need to be installed and operated after remedy is in place. Current proposed throughput is 20-35 gpm and not a high volume treatment. PG&E Response: The purpose of the contingent DMRS is to remove scaling ions (iron, manganese, calcium, and magnesium) from remedy-produced water for well and aquifer protection. Contingencies related to migration of Cr(VI) and in-situ byproducts are presented in Table 2.1-1 of the O&M Contingency Plan (O&M Manual Volume 3).
235	Hualapai/TRC	Design	Remedial Design	3.2.2.1 p. 3-16 Description River Bank Extraction	Four of the River Bank Extraction Wells (shown	Specific to the control of potential migration of byproduct migration with the use of river bank extraction wells, please indicate where in the 90% BOD detailed discussions are included pertaining to the method used to remove byproducts from extracted/recirculated water. The information provided on the DMRS is not sufficient to evaluate the efficacy of the design.	See above			The Dissolved Metal Removal System (DMRS) contingency plan was presented in	DTSC response: See RTC #234

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				Wells	on Figure ES-4A) are planned to be operated initially, although flexibility will be provided to operate any and all River Bank Extraction Wells at any given time based on the need to control potential migration of Cr(VI) located down gradient of the NTH IRZ, control byproduct migration					response to concerns regarding the possible effects of remedy byproducts on groundwater pH, integrity of the organic rind, and the quality of the Colorado River. However, there were few discussions regarding possible scenarios where there could be endangerment to the rind and river. We are uncertain what the DMRS proposes to accomplish, except that a large capacity treatment system to treat high manganese or arsenic concentrations would be no different than a classic pump-and-treat system. If this is the case, then the pump-and-treat system should be employed from the beginning. Otherwise, more discussions are needed regarding the possible scenarios that could endanger the river, and what could be done about it. For example, rather than pump-and-treat, how about chemical stabilization of the byproduct plume using reagents? Response unresolved pending further design scenarios and contingency plans.	
236	Cocopah/TRC	Design	Remedial Design	3.2.2.1 p. 3-16 Description River Bank Extraction Wells	Four of the River Bank Extraction Wells (shown on Figure ES-4A) are planned to be operated initially, although flexibility will be provided to operate any and all River Bank Extraction Wells at any	Specific to the control of potential migration of byproduct migration with the use of river bank extraction wells, please indicate where in the 90% BOD detailed discussions are included pertaining to the method used to remove byproducts from extracted/recirculated water. The information provided on the DMRS is not sufficient to evaluate the efficacy of the design.	See above			The Dissolved Metal Removal System (DMRS) contingency plan was presented in response to concerns regarding the possible effects of remedy byproducts on groundwater pH, integrity of the organic rind, and the quality of the Colorado River. However, there were few discussions regarding possible scenarios where there	DTSC response: See RTC #234

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					given time based on the need to control potential migration of Cr(VI) located down gradient of the NTH IRZ, control byproduct migration					could be endangerment to the rind and river. We are uncertain what the DMRS proposes to accomplish, except that a large capacity treatment system to treat high manganese or arsenic concentrations would be no different than a classic pump-and-treat system. If this is the case, then the pump-and-treat system should be employed from the beginning. Otherwise, more discussions are needed regarding the possible scenarios that could endanger the river, and what could be done about it. For example, rather than pump-and-treat, how about chemical stabilization of the byproduct plume using reagents? Response unresolved pending further design scenarios and contingency plans.	
237	Chemehuevi/ TRC	Design	Remedial Design	3.2.2.1 p. 3-16 Description River Bank Extraction Wells	Four of the River Bank Extraction Wells (shown on Figure ES-4A) are planned to be operated initially, although flexibility will be provided to operate any and all River Bank Extraction Wells at any given time based on the need to control potential migration of Cr(VI) located down gradient of the NTH IRZ, control byproduct migration	Specific to the control of potential migration of byproduct migration with the use of river bank extraction wells, please indicate where in the 90% BOD detailed discussions are included pertaining to the method used to remove byproducts from extracted/recirculated water. The information provided on the DMRS is not sufficient to evaluate the efficacy of the design.	See above			The Dissolved Metal Removal System (DMRS) contingency plan was presented in response to concerns regarding the possible effects of remedy byproducts on groundwater pH, integrity of the organic rind, and the quality of the Colorado River. However, there were few discussions regarding possible scenarios where there could be endangerment to the rind and river. We are uncertain what the DMRS proposes to accomplish, except that a large capacity treatment system to treat high manganese or arsenic concentrations would be no different than a classic pump-and-treat	DTSC response: See RTC #234

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										system. If this is the case, then the pump-and-treat system should be employed from the beginning. Otherwise, more discussions are needed regarding the possible scenarios that could endanger the river, and what could be done about it. For example, rather than pump-and-treat, how about chemical stabilization of the byproduct plume using reagents? Response unresolved pending further design scenarios and contingency plans.	
238	DTSC-59	Non-design	Editorial	3.2.2.1 Description River Bank Extraction Well Details/ Page 3-17	"Note that the lower screen of the River Bank Extraction Wells are proposed to be screened beneath the reducing rind to minimize negative hydraulic impacts to this natural reductive zone, and to minimize the potential for well fouling caused by ~~the high dissolved mineral content of~~ the naturally-reduced groundwater of the rind."	It seems that this sentence should be revised as indicated in the adjacent column to emphasize that fouling due to reduced groundwater being injected into an aerobic aquifer is the key issue. For example, high dissolved mineral content is also being extracted from the lower screen, but is not called out as a concern.	Revision will be made as requested.	Resolved.			Comment resolved.
239	DTSC-60	Design	Remedial design	3.2.2.1 Description Inner Recirculation Loop Injection Well Layout and Flow Rate/ Page 3-18	"The current layout of the Groundwater Flow and Solute Transport Model has the two northern Inner Recirculation Loop Injection Wells (IRL-1 and IRL-2)	DTSC has previously requested that the shallow aquifer be managed for TDS at the IRL injection area. PG&E responded by installing dual screen IRL injection wells so that elevated TDS could be injected into similar TDS zones at depth and not adversely impact the shallow zone that has low TDS. DTSC assumed that freshwater would be injected in the shallow screen at IRL 1 and 2 to assist in managing TDS over time. Table 3.2.-2 indicates that a dual screen well is installed, but the upper screen is not being used. Please discuss anticipated impacts to hydraulic movement if upper third of aquifer is not receiving water. The document should be revised to inject an appropriate amount (e.g., 15 to 20 gpm) of freshwater into the shallow screens at IRL-1 and 2. DTSC is concerned that not injecting water into the shallow screens would not protect the shallow TDS (see results of IM-3 injection monitoring). There is also concern whether the groundwater model flow path and particle track figures have been updated throughout the 90% design document that actually portray not injecting into Layer 1 at both IRL 1 and 2.	Although the proposed injection into IRL-1 and IRL-2 is focused on the deeper portion of the screen, it is anticipated that the resultant mounding and increased pressure head will still enhance flushing in the shallow portion of the alluvial aquifer. TDS mixing may occur within the immediate vicinity of	Increasing TDS concentration trends in the shallow aquifer downgradient of IRL-1 and IRL-2 should trigger fresh water injection at those IRLs if TDS levels depart background levels (e.g., greater than ~1,000 ppm).			

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					receiving water from the River Bank Extraction Wells (without carbon amendment) to the lower two-thirds of the saturated interval, while fresh water is injected at the two southern wells (IRL-3 and IRL-4)."		the well, but it is not anticipated to result in any significant density driven flow. Additionally, freshwater is being injected across the full screen of the upgradient freshwater injection wells (IRL-3, IRL-4, and FW-1) at a total nominal rate of 400 gpm (more than that will help to preserve lower TDS values in the shallow portion of the aquifer throughout the area reducing the need for shallow freshwater injection at IRL-1 and IRL-2. Although the need for shallow freshwater injection into IRL-1 and IRL-2 is not anticipated, flexibility was built into the design if it is deemed necessary. Hydraulic gradients and TDS concentrations in the shallow aquifer will be monitored in the vicinity of IRL-1 and IRL-2 to gauge the impact of deep injection into these two wells. If there are steady increasing TDS concentration trends in the shallow aquifer downgradient of IRL-1 and IRL-2, freshwater injection into the shallow screen of IRL-1 and IRL-2 will be considered. Groundwater flow modeling and particle pathlines indicate that without shallow injection in IRL-1 and IRL-2, the resultant gradient magnitudes are similar. The greatest impact is the radial distribution of particles around IRL-1 and IRL-2 shallow is narrowed and at depth is widened, but there is not a significant impact on the remedy performance. Figures will be adjusted	Comparison to approaching deep TDS concentrations that can exceed 10,000 ppm is not appropriate.			

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							accordingly. Given the plume footprint widens with depth, injecting only in the deeper screens in IRL-1 and IRL-2 may slightly enhance remedial timeframes.				
240	FMIT/TRC	Design	Remedial design	3.2.2.1 p. 3-18 Inner Recirculation Loop Injection Well Layout and Flow Rate	Future provisional well IRL-5 may be located in the area between IRL-3 and IRL-4 to provide additional eastward hydraulic push along the western edge of the Cr(VI) plume (Figure ES-4A). In addition, future provisional wells IRL-6 and IRL-7, located in the current central portion of the chromium plume (Figure ES-4A), were included as “late time” remediation wells that are intended to accelerate the remediation process once eastward migration of the plume has occurred. However, the need for installation and activation of these provisional wells will depend on operational and monitoring data, and earlier start- up may be determined to be necessary. Decision criteria for increasing the	Please document the Tribal input that has been sought and provided specific to the arsenic monitoring wells around the proposed IRL 5, 6, 7.	Proposed arsenic monitoring well locations were provided to the TWG on April 14, 2014. The proposed locations included a map of provisional IRZ-5, 6, and 7 locations and associated potential locations for 150 and 225 foot arsenic monitoring wells. A sitewalk was held on April 17, 2014 to review the proposed arsenic monitoring well locations. Tribes provided written feedback in proposed locations in May 2014, although no comments specific to the arsenic monitoring wells for the provisional injection wells were received.			The Tribe expects that the any future decisions pertaining to arsenic monitoring well locations will continue to incorporate Tribal input and concerns. The Tribe states its intended interest to stay involved with any future design decisions with the same level of involvement that has occurred during the drafting of the work plan. The Tribe needs to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources.	DTSC Response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					number of IRL Injection Wells are provided in the O&M Manual, Volume 2, Section 2.2.2.						
241	Hualapai/TRC	Design	Remedial Design	3.2.2.1 p. 3-18 Inner Recirculation Loop Injection Well Layout and Flow Rate	Future provisional well IRL-5 may be located in the area between IRL-3 and IRL-4 to provide additional eastward hydraulic push along the western edge of the Cr(VI) plume (Figure ES-4A). In addition, future provisional wells IRL-6 and IRL-7, located in the current central portion of the chromium plume (Figure ES-4A), were included as “late time” remediation wells that are intended to accelerate the remediation process once eastward migration of the plume has occurred. However, the need for installation and activation of these provisional wells will depend on operational and monitoring data, and earlier start- up may be determined to be necessary. Decision criteria for increasing the	Please document the Tribal input that has been sought and provided specific to the arsenic monitoring wells around the proposed IRL 5, 6, 7.	See above			Hualapai expects that the any future decisions pertaining to arsenic monitoring well locations will continue to incorporate Hualapai input and concerns. Hualapai state their intended interest to stay involved with any future design decisions with the same level of involvement that has occurred during the drafting of the work plan. The Hualapai need to be included in all alternative/ additional well location discussions. This includes Hualapai presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources.	DTSC Response: Tribal comment noted.

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					number of IRL Injection Wells are provided in the O&M Manual, Volume 2, Section 2.2.2.						
242	Cocopah/TRC	Design	Remedial Design	3.2.2.1 p. 3-18 Inner Recirculation Loop Injection Well Layout and Flow Rate	Future provisional well IRL-5 may be located in the area between IRL-3 and IRL-4 to provide additional eastward hydraulic push along the western edge of the Cr(VI) plume (Figure ES-4A). In addition, future provisional wells IRL-6 and IRL-7, located in the current central portion of the chromium plume (Figure ES-4A), were included as “late time” remediation wells that are intended to accelerate the remediation process once eastward migration of the plume has occurred. However, the need for installation and activation of these provisional wells will depend on operational and monitoring data, and earlier start- up may be determined to be necessary. Decision criteria for increasing the	Please document the Tribal input that has been sought and provided specific to the arsenic monitoring wells around the proposed IRL 5, 6, 7.	See above			The Tribes expect that the any future decisions pertaining to arsenic monitoring well locations will continue to incorporate Tribal input and concerns. The Tribes state their intended interest to stay involved with any future design decisions with the same level of involvement that has occurred during the drafting of the work plan. The Tribes need to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources.	DTSC Response: Tribal comment noted.

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					number of IRL Injection Wells are provided in the O&M Manual, Volume 2, Section 2.2.2.						
243	Chemehuevi/ TRC	Design	Remedial Design	3.2.2.1 p. 3-18 Inner Recirculation Loop Injection Well Layout and Flow Rate	Future provisional well IRL-5 may be located in the area between IRL-3 and IRL-4 to provide additional eastward hydraulic push along the western edge of the Cr(VI) plume (Figure ES-4A). In addition, future provisional wells IRL-6 and IRL-7, located in the current central portion of the chromium plume (Figure ES-4A), were included as “late time” remediation wells that are intended to accelerate the remediation process once eastward migration of the plume has occurred. However, the need for installation and activation of these provisional wells will depend on operational and monitoring data, and earlier start- up may be determined to be necessary. Decision criteria for increasing the	Please document the Tribal input that has been sought and provided specific to the arsenic monitoring wells around the proposed IRL 5, 6, 7.	See above			The Tribes expect that the any future decisions pertaining to arsenic monitoring well locations will continue to incorporate Tribal input and concerns. The Tribes state their intended interest to stay involved with any future design decisions with the same level of involvement that has occurred during the drafting of the work plan. The Tribes need to be included in all alternative/additional well location discussions. This includes Tribal presence at meetings and field visits to evaluate proposed changes in well location(s) or replacement wells. These efforts are needed to minimize impacts to cultural and environmental resources	DTSC Response: Tribal comment noted.

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					number of IRL Injection Wells are provided in the O&M Manual, Volume 2, Section 2.2.2.						
244	FMIT/TRC 1f	Design	Remedial Design	3.2.2.1 Inner Recirculation Loop Injection Well Layout and Flow Rate	Future provisional well IRL-5 may be located in the area between IRL-3 and IRL-4 to provide additional eastward hydraulic push along the western edge of the Cr(VI) plume (Figure ES-4A). In addition, future provisional wells IRL-6 and IRL-7, located in the current central portion of the chromium plume (Figure ES-4A), were included as "late time" remediation wells that are intended to accelerate the remediation process once eastward migration of the plume has occurred. However, the need for installation and activation of these provisional wells will depend on operational and monitoring data, and earlier start- up may be determined to be necessary. Decision criteria for increasing the number of	What level of Tribal stakeholder involvement will be provided during the future discussions of injection and monitoring well placement? In addition please memorialize the Tribal input that has been sought and provided specific to the arsenic monitoring wells around the proposed IRL 5, 6, 7.	See RTC #218 FMIT/ TRC-1e.			Please see response to comment FMIT/TRC RTC #44.	DTSC Response: Tribal comment noted.

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					IRL Injection Wells are provided in the O&M Manual, Volume 2, Section 2.2.2.						
245	Hualapai/TRC 1f	Design	Remedial Design	3.2.2.1 Inner Recirculation Loop Injection Well Layout and Flow Rate	Future provisional well IRL-5 may be located in the area between IRL-3 and IRL-4 to provide additional eastward hydraulic push along the western edge of the Cr(VI) plume (Figure ES-4A). In addition, future provisional wells IRL-6 and IRL-7, located in the current central portion of the chromium plume (Figure ES-4A), were included as "late time" remediation wells that are intended to accelerate the remediation process once eastward migration of the plume has occurred. However, the need for installation and activation of these provisional wells will depend on operational and monitoring data, and earlier start- up may be determined to be necessary. Decision criteria for increasing the number of IRL Injection	What level of Tribal stakeholder involvement will be provided during the future discussions of injection and monitoring well placement? In addition please memorialize the Tribal input that has been sought and provided specific to the arsenic monitoring wells around the proposed IRL 5, 6, 7.	See above			See response to comment Hualapai/ TRC RTC #83	DTSC Response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					Wells are provided in the O&M Manual, Volume 2, Section 2.2.2.						
246	Cocopah/TRC 1f	Design	Remedial Design	3.2.2.1 Inner Recirculation Loop Injection Well Layout and Flow Rate	Future provisional well IRL-5 may be located in the area between IRL-3 and IRL-4 to provide additional eastward hydraulic push along the western edge of the Cr(VI) plume (Figure ES-4A). In addition, future provisional wells IRL-6 and IRL-7, located in the current central portion of the chromium plume (Figure ES-4A), were included as “late time” remediation wells that are intended to accelerate the remediation process once eastward migration of the plume has occurred. However, the need for installation and activation of these provisional wells will depend on operational and monitoring data, and earlier start- up may be determined to be necessary. Decision criteria for increasing the number of IRL Injection Wells are	What level of Tribal stakeholder involvement will be provided during the future discussions of injection and monitoring well placement? In addition please memorialize the Tribal input that has been sought and provided specific to the arsenic monitoring wells around the proposed IRL 5, 6, 7.	See above			See response to Cocopah RTC #84.	DTSC Response: Tribal comment noted.

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					provided in the O&M Manual, Volume 2, Section 2.2.2.						
247	Chemehuevi/ TRC 1f	Design	Remedial Design	3.2.2.1 Inner Recirculation Loop Injection Well Layout and Flow Rate	Future provisional well IRL-5 may be located in the area between IRL-3 and IRL-4 to provide additional eastward hydraulic push along the western edge of the Cr(VI) plume (Figure ES-4A). In addition, future provisional wells IRL-6 and IRL-7, located in the current central portion of the chromium plume (Figure ES-4A), were included as "late time" remediation wells that are intended to accelerate the remediation process once eastward migration of the plume has occurred. However, the need for installation and activation of these provisional wells will depend on operational and monitoring data, and earlier start- up may be determined to be necessary. Decision criteria for increasing the number of IRL Injection Wells are provided in the	What level of Tribal stakeholder involvement will be provided during the future discussions of injection and monitoring well placement? In addition please memorialize the Tribal input that has been sought and provided specific to the arsenic monitoring wells around the proposed IRL 5, 6, 7.	See above			See Chemehuevi/TRC RTC #85.	DTSC Response: Tribal comment noted.

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					O&M Manual, Volume 2, Section 2.2.2.						
248	DTSC-61	Design	Remedial design	3.2.3 TCS Recirculation Loop/ Page 3-22	Exhibit 3.2-3 “…maximum flow includes up to 75 gpm of freshwater”	The basis and triggers for adding up to 75 gpm freshwater to the TCS loop needs to be discussed as it is lacking in the document. Discussion is also lacking in Section 3.3.3 and Exhibit 3.3-4.	Freshwater would be used in the TCS Recirculation Loop should yields from the Transwestern Bench Extraction Wells and East Ravine Extraction Wells be insufficient to promote treatment in this area,. The maximum of 75 gpm is specified to match the design maximum injection flow rate. However, this scenario is not likely. We recommend moving this potential scenario of injecting freshwater into the TCS injection loop to Appendix L, Volume 3, the Contingency Plan, Table 2.1-1 in the TCS Recirculation loop section. This section will acknowledge that a plan for arsenic monitoring wells and establishing baseline arsenic conditions including prior carbon injections in the area would be required prior to changing operations to injection of freshwater at the TCS injection wells. The quoted design detail on use of freshwater at the TCS injection loop in Exhibit 3.2-3 in the main BOD will be deleted. The following text will be edited in Section 3.2.3.3 Uncertainties and Assumptions, “Modifications to operations and design may include adjustments to injection rates, extraction rates, <u>augmentation of injection rates with freshwater</u>, and/or organic carbon loading.”	Resolved.			Comment resolved.
249	DTSC-62	Design	Remedial design	3.2.3.1 Description/East Ravine Extraction Well Details/	“Up to 6-inch nominal diameter carrier casing would be set to	Is there any advantage to drilling the East Ravine extraction wells with larger diameters (e.g., 12-inches as previously proposed) to better accommodate anticipated well cycling due to low yield?	Based on the hydraulic testing of the bedrock wells previously constructed in the East Ravine area, PG&E	Resolved.			Comment resolved.

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				Page 3-23	the top of competent bedrock, or a minimum of 20 feet bgs."		anticipates that the East Ravine extraction wells will be low yielding relative to wells installed within the unconsolidated aquifer. Therefore, it is anticipated that the current design, which utilizes 5-inch diameter wells/boreholes, will be sufficient to operate submersible pumps up to 4-inches in diameter. A 4-inch diameter pump is capable of providing flows in the tens to hundreds of gallons per minute (gpm), which is significantly greater than the less than 10 gpm yield that is current estimated for these wells. Therefore, there is not a significant advantage to constructing the East Ravine extraction wells with a larger diameter at this time; however, as discussed in the response to comment 950 (DTSC-171), the diameter of the carrier casing will be increased to 12-inch to allow for reaming the bedrock borehole to a larger diameter at a future date if well performance were to decline significantly or if actual well yield warrants a larger pump.				
250	DOI-4	Non-design	Other	3.2.3.1/3-23	Up to 6-inch nominal diameter carrier casing would be set to the top of competent bedrock, or a minimum of 20 feet bgs.	The latter part of this statement is confusing. It indicates carrier casing would not be set at the top of bedrock if bedrock were greater than 20 feet bgs, and if bedrock were near the ground surface, it indicates the casing would be set 20 feet into bedrock. Neither scenario seems logical. Suggest deleting "or a minimum of 20 feet bgs".	The carrier casing diameter is now 12-inch per RTC #950. The sentence will be clarified as follows: "Up to 12-inch nominal diameter carrier casing would be set to the top of competent bedrock, or a minimum of 20 feet bgs. A minimum of 20 feet of carrier casing is required to comply with State well regulations for a sanitary seal."		Resolved		Comment resolved.
251	DTSC-63	Design	Remedial design	3.2.3.3 Uncertainties	"The need for and location of	The sentence should be modified to clearly allow for an injection or extraction well to be installed to optimize the remedy, not just as a contingency for remedy failure. The following modification is	The referenced text will be revised as follows:	Resolved.			Comment resolved.

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				and Assumptions/ Page 3-27	additional injection and/or extraction wells will be evaluated and considered as operational data are collected and system performance is evaluated."	requested: "The need for and location of additional injection and/or extraction wells will be evaluated and considered as operational data are collected and system performance is evaluated as part of contingency measures or remedy optimization."	"The need for and location of additional injection and/or extraction wells will be evaluated and considered as operational data are collected and system performance is evaluated for remedy optimization or contingency measure implementation."				
252	FMIT/TRC 1g	Design	Remedial Design	3.2.3.3 Uncertainties and Assumptions	The TCS Recirculation Loop will be implemented and operated using an adaptive approach, similar to operation of the NTH IRZ system—data will be collected from select monitoring wells, and operations will be modified to optimize the remedy performance. Modifications to operations and design may include adjustments to injection rates, extraction rates, extraction locations, and/or organic carbon loading.	It should be noted that throughout the document the location of wells has much flexibility, what type of Tribal involvement will be allowed after the 100% BOD is released?	See RTC #218 FMIT/ TRC-1e.			Please see response to comment FMIT/TRC RTC #44.	DTSC Response: Tribal comment noted.
253	Hualapai/TRC 1g	Design	Remedial Design	3.2.3.3 Uncertainties and Assumptions	The TCS Recirculation Loop will be implemented and operated using an adaptive approach, similar to operation of the NTH IRZ system—data will be collected from select monitoring	It should be noted that throughout the document the location of wells has much flexibility, what type of Tribal involvement will be allowed after the 100% BOD is released?	See above			See response to comment Hualapai/ TRC RTC #83	DTSC Response: Tribal comment noted.

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					wells, and operations will be modified to optimize the remedy performance. Modifications to operations and design may include adjustments to injection rates, extraction rates, extraction locations, and/or organic carbon loading.						
254	Cocopah/TRC 1g	Design	Remedial Design	3.2.3.3 Uncertainties and Assumptions	The TCS Recirculation Loop will be implemented and operated using an adaptive approach, similar to operation of the NTH IRZ system—data will be collected from select monitoring wells, and operations will be modified to optimize the remedy performance. Modifications to operations and design may include adjustments to injection rates, extraction rates, extraction locations, and/or organic carbon loading.	It should be noted that throughout the document the location of wells has much flexibility, what type of Tribal involvement will be allowed after the 100% BOD is released?	See above			See response to Cocopah RTC #84.	DTSC Response: Tribal comment noted.
255	Chemehuevi/ TRC 1g	Design	Remedial Design	3.2.3.3 Uncertainties and Assumptions	The TCS Recirculation Loop will be implemented and operated using an adaptive approach, similar to operation of the NTH IRZ	It should be noted that throughout the document the location of wells has much flexibility, what type of Tribal involvement will be allowed after the 100% BOD is released?	See above			See Chemehuevi/TRC RTC #85.	DTSC Response: Tribal comment noted.

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					system—data will be collected from select monitoring wells, and operations will be modified to optimize the remedy performance. Modifications to operations and design may include adjustments to injection rates, extraction rates, extraction locations, and/or organic carbon loading.						
256	FMIT/TRC 1h	Design	Remedial Design	3.2.2.3 Uncertainties and Assumptions	Modifications to operations and design may include adjustments to injection rates, extraction rates, injection or extraction locations, and/or organic carbon loading. The specifications on injection/extraction flow rates, the carbon source, carbon concentrations, etc. presented in this document are a starting point for design and implementation, but may vary in practice as the adaptive operational approach is implemented.	This seems contrary to intense amount of stakeholder involvement in determining agreeable locations of much of the infrastructure location. Specifically much work has gone into determining agreeable well locations by including the tribes? This statement however appears to suggest that well location as outlined in the BOD report is only a starting point. Please confirm that the Tribes will be included in any future discussions regarding modifications of the design.	See RTC #218 FMIT/ TRC-1e.			Please see response to comment FMIT/TRC RTC #44.	DTSC Response: Tribal comment noted.
257	Hualapai/TRC 1h	Design	Remedial Design	3.2.2.3 Uncertainties and Assumptions	Modifications to operations and design may include adjustments to injection rates, extraction rates, injection	This seems contrary to intense amount of stakeholder involvement in determining agreeable locations of much of the infrastructure location. Specifically much work has gone into determining agreeable well locations by including the tribes? This statement however appears to suggest that well location as outlined in the BOD report is only a starting point. Please confirm that the Tribes will be included in any future discussions regarding modifications of the design.	See above			See response to comment Hualapai/ TRC RTC #83	DTSC Response: Tribal comment noted.

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					or extraction locations, and/or organic carbon loading. The specifications on injection/extraction flow rates, the carbon source, carbon concentrations, etc. presented in this document are a starting point for design and implementation, but may vary in practice as the adaptive operational approach is implemented.						
258	Cocopah/TRC 1h	Design	Remedial Design	3.2.2.3 Uncertainties and Assumptions	Modifications to operations and design may include adjustments to injection rates, extraction rates, injection or extraction locations, and/or organic carbon loading. The specifications on injection/extraction flow rates, the carbon source, carbon concentrations, etc. presented in this document are a starting point for design and implementation, but may vary in practice as the adaptive operational approach is implemented.	This seems contrary to intense amount of stakeholder involvement in determining agreeable locations of much of the infrastructure location. Specifically much work has gone into determining agreeable well locations by including the tribes? This statement however appears to suggest that well location as outlined in the BOD report is only a starting point. Please confirm that the Tribes will be included in any future discussions regarding modifications of the design.	See above			See response to Cocopah RTC #84.	DTSC Response: Tribal comment noted.
259	Chemehuevi/ TRC 1h	Design	Remedial Design	3.2.2.3 Uncertainties and Assumptions	Modifications to operations and design may include adjustments to injection rates,	This seems contrary to intense amount of stakeholder involvement in determining agreeable locations of much of the infrastructure location. Specifically much work has gone into determining agreeable well locations by including the tribes? This statement however appears to suggest that well location as outlined in the BOD report is only a starting point. Please confirm that the Tribes will be included in any future discussions regarding modifications of the design.	See above			See Chemehuevi/TRC RTC #85.	DTSC Response: Tribal comment noted.

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					extraction rates, injection or extraction locations, and/or organic carbon loading. The specifications on injection/extraction flow rates, the carbon source, carbon concentrations, etc. presented in this document are a starting point for design and implementation, but may vary in practice as the adaptive operational approach is implemented.						
260	FMIT/TRC	Design	Infrastructures	3.2	Tables 3.2-1 to 3.2-4	Tables 3.2-1 thru 3.2-4 contain projected locational coordinates but the projected coordinate system is not indicated. Please indicate the coordinate system. Also, the coordinates should be indicated to the nearest foot, or tenth of a foot, rather than to the nearest thousandth of a foot – a precision which is not attainable in the field using equipment likely to be used. Also, the tables contain fonts in either black or gray – which indicate provisional or planned. This should be stated in the table description. Also, the text discusses 3 categories of wells, but the tables do not reflect the categorization, but should.	The coordinate system used at the site is State Plane. A note will be added to these tables referencing the coordinate system. The tables will be modified to reflect rounding to the nearest 0.1 ft. There is already a note at the bottom of the tables indicating that grey italics indicate future provisional. A column will be added to these tables indicating well category.			In the note to be added, please indicate the State Plane Zone, and horizontal datum. With the additional text, this comment is considered resolved.	Comment resolved.
261	Hualapai/TRC	Design	Infrastructures	3.2	Tables 3.2-1 to 3.2-4	Tables 3.2-1 thru 3.2-4 contain projected locational coordinates but the projected coordinate system is not indicated. Please indicate the coordinate system. Also, the coordinates should be indicated to the nearest foot, or tenth of a foot, rather than to the nearest thousandth of a foot – a precision which is not attainable in the field using equipment likely to be used. Also, the tables contain fonts in either black or gray – which indicate provisional or planned. This should be stated in the table description. Also, the text discusses 3 categories of wells, but the tables do not reflect the categorization, but should.	See above			In the note to be added, please indicate the State Plane Zone, and horizontal datum. With the additional text, this comment is considered resolved.	Comment resolved.
262	Cocopah/TRC	Design	Infrastructures	3.2	Tables 3.2-1 to 3.2-4	Tables 3.2-1 thru 3.2-4 contain projected locational coordinates but the projected coordinate system is not indicated. Please indicate the coordinate system. Also, the coordinates should be indicated to the nearest foot, or tenth of a foot, rather than to the nearest thousandth of a foot – a precision which is not attainable in the field using equipment likely to be used. Also, the tables contain fonts in either black or gray – which indicate provisional or planned. This should be stated in the table description. Also, the text discusses 3 categories of wells, but the tables do not reflect the categorization, but should.	See above			In the note to be added, please indicate the State Plane Zone, and horizontal datum. With the additional text, this comment is considered resolved.	Comment resolved.
263	Chemehuevi/ TRC	Design	Infrastructures	3.2	Tables 3.2-1 to 3.2-4	Tables 3.2-1 thru 3.2-4 contain projected locational coordinates but the projected coordinate system is not indicated. Please indicate the coordinate system. Also, the coordinates should be indicated to the nearest foot, or tenth of a foot, rather than to the nearest thousandth of a foot – a precision which is not attainable in the field using equipment likely to be used. Also, the tables contain fonts in either black or gray – which indicate provisional or planned. This should be stated	See above			In the note to be added, please indicate the State Plane Zone, and horizontal datum. With the additional	Comment resolved.

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						in the table description. Also, the text discusses 3 categories of wells, but the tables do not reflect the categorization, but should.				text, this comment is considered resolved.	
264	DTSC-64	Design	Request for Information	Section 3.2.4.1, CIP description, page 3-28, 2nd paragraph	"… and clean water will be used to flush the lines."	Is this water from Arizona? Where is the source of the clean water for line flushing?	The clean water referenced in the specified text is anticipated to be freshwater from Arizona, although conditioned water from the Remedy Produced Water Conditioning Plant may also be considered. The text will be revised to read "freshwater or conditioned water" in place of "clean water".	Resolved.			Comment resolved.
265	DTSC-65	Design	Editorial	3-31	Below-grade piping will be constructed with HDPE pipe in a standard construction trench.	Additional text describing above-grade piping construction, similar to the description for below-grade, should be added for clarity.	The IRZ system design does not include above-grade piping outside of the MW-20 Bench; thus, text describing above-grade piping construction is not considered applicable to this section (Section 3.2.5.2 of the BOD).	Resolved.			Comment resolved.
266	DTSC-66	Non-design	Editorial	3.3.1 Freshwater Supply Sources/ Page 3-32	"However, the groundwater in the shallow zone beneath the river contains water that is geochemically reduced and contains elevated concentrations of iron and manganese, which could foul the injection wells. It is likely that a conditioning system would be needed to remove iron and manganese before the water pumped from beneath the river bottom could be used in the injection wells. Therefore, no matter whether water was extracted	As part of TDS groundwater management discussions, PG&E has recently cited data from deep extraction well PE-1 and how it indicates that initial deep water conditions (e.g., high TDS) have changed over time due to capture of groundwater from the shallow zone. PG&E indicates that high TDS concentrations indicative of the deep zone will be a transient condition and lower in concentration as Riverbank wells operate over the years. It is noteworthy that the PE-1 data also indicate that iron and manganese in the deep portion of the aquifer actually decrease over time along with the TDS. This suggests that the shallow zone in the vicinity of PE-1 might have minimal effect with regards to injection well fouling should a shallow infiltration gallery beneath the river be ever be installed. Therefore, revision of the cited text is requested.	PE-1 is completed in a zone of coarse sand and gravel that lies at a depth between 90 and 100 feet just above bedrock. Unlike the shallow sediments near the river, this zone is sufficiently oxic to contain Cr(VI). Thus PE-1 is not representative of the geologic materials or the geochemical reducing conditions in shallow floodplain where an infiltration gallery would be installed. The concentrations of iron and manganese typically found in the shallow floodplain wells (at depths typical of an infiltration trench) would quickly foul an injection well. While it is true that after extended pumping the water quality from an infiltration gallery might improve, PG&E does not agree that one could assume no treatment would be needed for	Resolved. This issue should be studied during remedy operation of extraction wells along the floodplain.			Comment resolved.

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					directly from the river or from beneath the river bed, some type of conditioning system would be needed to make river water usable for injection."		water sourced from an infiltration gallery. We propose to revise the text be revised as follows: "It is likely that a conditioning system would be needed, <u>at least during the first few years</u>, to remove iron and manganese <u>from groundwater that is extracted from more reduced portions of the aquifer beneath the river such that the potential for fouling of the associated injection wells is minimized</u>."				
267	DTSC-67	Design	Contingencies	3.3.2 Evaluation of Freshwater Supply Sources/Selection of Preferred Source/ Page 3-34	EXHIBIT 3.3-1 "Because of this separation of freshwater storage, the tie-in of Topock-2 and -3 wells has been eliminated in the 90% design."	It is requested that the tie-in be retained as DTSC believes that the Topock-2 and -3 wells could easily act as an immediate contingency measure to supplement the remedy that would not require delay or added infrastructure.	Topock-2 and -3 wells currently supply freshwater for TCS use for fire protection and operational needs, via the existing 6-inch pipeline. At the 60% design stage, it was decided to separate the freshwater supply for TCS and remedy to ensure that the use of the infrastructure designed and constructed under this project is prioritized for remedy use first (see 60% RTC 168 DTSC-63). Hence the tie-in of Topock-2 and -3 wells was eliminated in the 90% design. To tie in Topock-2 and -3 wells for remedy use, additional infrastructure will be needed within the Compressor Station footprint. In response to DTSC's request, additional details that describe this tie-in were provided for review during the 90% RTC period and included in **Attachment E** of the final RTC table. Please note that if there is competing need for Topock-2 and -3 water, the first priority for this	**Attachment E** should also include the design of the piping from the gate valves to the remedy fresh water tank in both map and section view. Note that DTSC would consider the Topock 2/3 water as an immediate			**Attachment E** was revised to address DTSC's comment.

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							water, as noted in 60% RTC 168 DTSC-63, is for fire protection and operational needs at the Station, and that priority cannot be changed.	short term contingency until a longer term solution could be implemented.			
268	DTSC-68	Design	Editorial	3.3.2 Evaluation of Freshwater Supply Sources/Selection of Preferred Source/ Page 3-34	EXHIBIT 3.3-1 "Therefore, any future use of Site B water for the remedy will require blending with other water (HNWR-1, HNWR-1A) or treatment prior to injection."	Revise text as indicated in the adjacent column.	For consistency with RTCs #135 and #267, PG&E suggests additional edits (shown in green) as follows: "Therefore, any future use of Site B water for the remedy will require blending with other water (HNWR-1, HNWR-1A, Topock-2/3) or treatment prior to injection."	Resolved.			Comment resolved.
269	DTSC-69	Design	Contingencies	3.3.2 Evaluation of Freshwater Supply Sources/Selection of Preferred Source/ Page 3-36	"After reviewing the available options for a freshwater supply, PG&E proposes the use of the HNWR-1A well as the primary freshwater source for the groundwater remedy in the 90% design, with the HNWR-1 well as a secondary source and Topock 2/3 and Site B well as a contingent source. To provide maximum flexibility and reliability in remedy freshwater supply, provisions to plumb and operate both HNWR-1, Topock 2/3 and Site B wells if needed in the future are provided in the 90% design."	Revise text as indicated in the adjacent column.	PG&E suggested additional edits (shown in green) as follows: "After reviewing the available options for a freshwater supply, PG&E proposes the use of the HNWR-1A well as the primary freshwater source for the groundwater remedy in the 90% design, with the HNWR-1 well as a secondary source and Topock 2/3 and Site B well as a contingent source. To provide maximum flexibility and reliability in remedy freshwater supply, provisions to plumb and operate both HNWR-1, Topock 2/3 and Site B wells if needed in the future are provided in the ~~90%~~final design."	Resolved.			Comment resolved.
270	FMIT/TRC	Non-design	Request for Information	3.3.2.1 Page 3-37	Also within this radius is a	Please provide specific details on what has been done to characterize this "dump" area to ensure that it is not a source of contamination?	As discussed in RTCs #276 FMIT/TRC, #277			Noted.	

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				Uncertainties and Assumptions - Source Water Assessment	former dump area which DTSC expressed concern about. This area consists of small area of rusty cans and other metal debris scattered on the land surface.		Hualapai/TRC, #278 Cocopah/TRC, and #279 Chemehuevi/TRC, an inspection of the area in question by PG&E showed it to be a scatter of cans and metal debris on the surface of the ground at the top of a slope. It is a thin veneer of debris laying on the natural grade. It was not excavated or otherwise engineered. It does not appear to be a likely source of groundwater contamination and even if it were, it would be captured by the Topock 2 and 3 wells. Topock-2 and -3 wells are currently being sampled and reported by Southwest Water as the water purveyor. As a customer of Southwest Water, PG&E receives the water quality information and will provide it on request.				
271	Hualapai/TRC	Non-design	Request for Information	3.3.2.1 Page 3-37 Uncertainties and Assumptions - Source Water Assessment	Also within this radius is a former dump area which DTSC expressed concern about. This area consists of small area of rusty cans and other metal debris scattered on the land surface.	Please provide specific details on what has been done to characterize this “dump” area to ensure that it is not a source of contamination?	See above			Noted.	
272	Cocopah/TRC	Non-design	Request for Information	3.3.2.1 Page 3-37 Uncertainties and Assumptions - Source Water Assessment	Also within this radius is a former dump area which DTSC expressed concern about. This area consists of small area of rusty cans and other metal debris scattered on the land surface.	Please provide specific details on what has been done to characterize this “dump” area to ensure that it is not a source of contamination?	See above			Noted.	

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273	Chemehuevi/ TRC	Non-design	Request for Information	3.3.2.1 Page 3-37 Uncertainties and Assumptions - Source Water Assessment	Also within this radius is a former dump area which DTSC expressed concern about. This area consists of small area of rusty cans and other metal debris scattered on the land surface.	Please provide specific details on what has been done to characterize this "dump" area to ensure that it is not a source of contamination?	See above			Noted.	
274	DTSC-70	Design	Contingencies	3.3.2.1 Uncertainties and Assumptions/ Page 3-38	EXHIBIT 3.3-2 "Bring Site B well online." Multiple occurrences.	First occurrence: Revise text as follows: "Supplement flow with water from Topock 2/3 or bring Site B well online potentially with a FWPTS for both arsenic and chromium." Second occurrence: Revise text as follows: "Bring on Topock 2/3 to supplement flow or bring Site B well online potentially with a FWPTS for both arsenic and chromium." Last occurrence: Revise text as follows: "Bring Site B well online along with a FWPTS for both arsenic and chromium."	In the event Site B well is needed to be brought on line (after the identified operational actions have been exhausted), PG&E will first collect sample(s) to confirm the Cr(VI) and As concentrations in the well. Site B water will be blended with water from other wells (e.g., HNWR-1, Topock-2 and -3). With the low levels of Cr(VI) (34 ppb) detected in Site B well in 2014, PG&E does not anticipate needing Cr treatment. PG&E will discuss with the Agencies before implementing any contingency measure. PG&E suggests additions edits (shown in green) to DTSC's edits: First occurrence: Revise text as follows: "Supplement flow with water from Topock 2/3 or bring Site B well online. Blend Site B water with water from Topock-2/3 and/or HNWR-1. Potentially implement ~~with~~ a ~~FWPTS~~ contingent ~~for both~~ arsenic ~~and chromium.~~ treatment system per State Water Resources Board letter (SWRCB 2013)[1]" Second occurrence:	See RTC # 135 on potential water quality issues associated with Site B well. Additionally, fresh water chromium concentrations in HNWR-1A/HNWR-1 could trend up over time during the life of the remedy. PG&E should not adversely impact the quality of the aquifer outside of the chromium plume from injection in California. The use of Site B contingency may not be needed, its use, however, may necessitate pre-treatment of the water prior to injection to maintain the water quality at the point of injection. Since chromium in the water from the Site B well has always been higher than the current MCL (10 ppb) and the current receiving water quality (shallow aquifer averages around 16 ppb), pre-treatment of chromium may also be required, not only arsenic.			

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							Revise text as follows: "Bring on Topock 2/3 to supplement flow or bring Site B well online. Blend Site B water with water from Topock-2/3 and/or HNWR-1 Potentially implement ~~with~~ a ~~FWPTS~~ contingent ~~for both~~ arsenic ~~and chromium.~~ treatment system per State Water Resources Board letter (SWRCB 2013)[1]" Last occurrence: Revise text as follows: "Bring Site B well online. Blend Site B water with water from Topock-2/3 and/or HNWR-1. Potentially implement ~~with~~ a ~~FWPTS~~ contingent ~~for both~~ arsenic ~~and chromium.~~ treatment system per State Water Resources Board letter (SWRCB 2013)[1]"	Therefore, it is recommended that this constraint be considered during the O&M phase of the remedy and prior to the use of contingent Site B well as fresh water supply well. PG&E will need to ensure that arsenic and chromium pretreatment, if necessary, could be conducted together within a similar building footprint.			
275	DTSC-71	Design	Remedial design	3.3.2.1 Uncertainties and Assumptions/ Page 3-38	EXHIBIT 3.3-2 "The letter requires that if the leading edge of the arsenic plume, i.e., arsenic concentrations at the concentration in the injected fresh water, extend more than 150 feet away from injection locations, PG&E must immediately reassess its modeling calculations and quickly identify interim actions it can take to limit the migration of the arsenic plume."	Revise text as follows: " "The letter requires that if ~~the leading edge of the arsenic plume, i.e.,~~ arsenic concentrations ~~at the concentration in the injected fresh water, extend more~~ exceed 10 ppb at monitoring wells located ~~than~~ 150 feet away from injection locations, PG&E must immediately reassess its modeling calculations and quickly identify interim actions it can take to limit the migration of the arsenic plume."	PG&E agrees with this comment and offers the following potential alternative edit: "The letter requires that if the leading edge of the arsenic plume above the 10 µg/L water quality objective~~, i.e., arsenic concentrations at the concentration in the injected fresh water,~~ extend more than 150 feet away from injection locations, PG&E must immediately reassess its modeling calculations and quickly identify interim actions it can take to limit the migration of the arsenic plume."	Okay.			Comment resolved.
276	FMIT/TRC	Non-design	Request for Information	3.3.2.1 Page 3-40 Uncertainties and	There are currently no monitoring wells in	Why is this now referred to an area with rusty can and metal debris rather than a dump? It is possible if this area was a former dump that potential impacts to the freshwater source may exist. How has this possibility been eliminated? Also what information is available about potential use changes in areas up gradient along Sacramento wash that could impact the groundwater source?	An inspection of the area in question by PG&E showed it to be a scatter of cans and		DOI cannot comment on potential uses of private lands	To ensure that water quality degradation does not occur in the HNRW1 freshwater	PG&E Response: As discussed in Section 5.4.1 of the Sampling and

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				Assumptions - Source Water Assessment	Sacramento Wash. The property upstream in Sacramento Wash is undeveloped for miles. The ADEQ conducted a survey of water quality in the Sacramento Valley in 1999 (ADEQ 2001). This survey found fluoride, chloride, and TDS to be the only constituents present in slightly elevated concentrations in the Topock area. Considering the lack of existing contaminant sources in the Sacramento Valley (Exhibit 3.3-3), the installation of monitoring wells in Sacramento Wash upstream of HNWR-1 for source water protection is not considered warranted. The Topock-2 and -3 wells are located between HNWR-1A and the former area with rusty cans and other metal debris, so in the unlikely event that groundwater contaminants are migrating from this area, they would be	For example can mining occur there?	metal debris on the surface of the ground at the top of a slope. It is a thin veneer of debris laying on the natural grade. It was not excavated or otherwise engineered. The description in the text is therefore accurate. It does not appear to be a likely source of groundwater contamination and even if it were, it would be captured by the Topock 2 and 3 wells. PG&E assumes that mining could occur in the Sacramento Wash drainage or elsewhere on public or private lands around the Topock area. It would be the responsibility of the federal and state regulating and permitting agencies to insure that any future mine was operated to prevent degradation of groundwater quality.		however the Havasu National Wildlife Refuge (HNWR), which includes the confluence of the Sacramento Wash with the Colorado River, is under federal jurisdiction. HNWR was established by Executive Order 8647 on January 22, 1941, "...as a refuge and breeding ground for migratory birds and other wildlife." Refuge goals and objectives are described in the Lower Colorado River Comprehensive Management Plan. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 provides authority for establishing policies and regulations governing refuge uses included the authority to prohibit certain harmful activities. All proposed and existing refuge uses must be deemed appropriate and compatible.	source aquifer over the lifetime of the remedy, the Tribe requests that water quality data from Topock wells 2 and 3 are included in future groundwater monitoring reports.	Monitoring Plan (O&M Volume 2), Topock-2 and -3 wells are currently being sampled and reported by Southwest Water as the water purveyor. As a customer of Southwest Water, PG&E receives the water quality information and will provide it to the agencies. DTSC/DOI response: The Agencies can pass on the information received from PG&E to stakeholders and Tribes when available.

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					expected to be detected first at Topock-2 and -3.						
277	Hualapai/TRC	Non-design	Request for Information	3.3.2.1 Page 3-40 Uncertainties and Assumptions - Source Water Assessment	There are currently no monitoring wells in Sacramento Wash. The property upstream in Sacramento Wash is undeveloped for miles. The ADEQ conducted a survey of water quality in the Sacramento Valley in 1999 (ADEQ 2001). This survey found fluoride, chloride, and TDS to be the only constituents present in slightly elevated concentrations in the Topock area. Considering the lack of existing contaminant sources in the Sacramento Valley (Exhibit 3.3-3), the installation of monitoring wells in Sacramento Wash upstream of HNWR-1 for source water protection is not considered warranted. The Topock-2 and -3 wells are located between HNWR-1A and the former area with rusty cans and other metal debris,	Why is this now referred to an area with rusty can and metal debris rather than a dump? It is possible if this area was a former dump that potential impacts to the freshwater source may exist. How has this possibility been eliminated? Also what information is available about potential use changes in areas up gradient along Sacramento wash that could impact the groundwater source? For example can mining occur there?	See above		See above	To ensure that water quality degradation does not occur in the HNRW1 freshwater source aquifer over the lifetime of the remedy, the Hualapai request that water quality data from Topock wells 2 and 3 are included in future groundwater monitoring reports.	See 276 above

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					so in the unlikely event that groundwater contaminants are migrating from this area, they would be expected to be detected first at Topock-2 and -3.						
278	Cocopah/TRC	Non-design	Request for Information	3.3.2.1 Page 3-40 Uncertainties and Assumptions - Source Water Assessment	There are currently no monitoring wells in Sacramento Wash. The property upstream in Sacramento Wash is undeveloped for miles. The ADEQ conducted a survey of water quality in the Sacramento Valley in 1999 (ADEQ 2001). This survey found fluoride, chloride, and TDS to be the only constituents present in slightly elevated concentrations in the Topock area. Considering the lack of existing contaminant sources in the Sacramento Valley (Exhibit 3.3-3), the installation of monitoring wells in Sacramento Wash upstream of HNWR-1 for source water protection is not considered warranted. The Topock-2 and -	Why is this now referred to an area with rusty can and metal debris rather than a dump? It is possible if this area was a former dump that potential impacts to the freshwater source may exist. How has this possibility been eliminated? Also what information is available about potential use changes in areas up gradient along Sacramento wash that could impact the groundwater source? For example can mining occur there?	See above		See above	To ensure that water quality degradation does not occur in the HNRW1 freshwater source aquifer over the lifetime of the remedy, the Tribes request that water quality data from Topock wells 2 and 3 are included in future groundwater monitoring reports.	See 276 above

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					3 wells are located between HNWR-1A and the former area with rusty cans and other metal debris, so in the unlikely event that groundwater contaminants are migrating from this area, they would be expected to be detected first at Topock-2 and -3.						
279	Chemehuevi/ TRC	Non-design	Request for Information	3.3.2.1 Page 3-40 Uncertainties and Assumptions - Source Water Assessment	There are currently no monitoring wells in Sacramento Wash. The property upstream in Sacramento Wash is undeveloped for miles. The ADEQ conducted a survey of water quality in the Sacramento Valley in 1999 (ADEQ 2001). This survey found fluoride, chloride, and TDS to be the only constituents present in slightly elevated concentrations in the Topock area. Considering the lack of existing contaminant sources in the Sacramento Valley (Exhibit 3.3-3), the installation of monitoring wells in Sacramento	Why is this now referred to an area with rusty can and metal debris rather than a dump? It is possible if this area was a former dump that potential impacts to the freshwater source may exist. How has this possibility been eliminated? Also what information is available about potential use changes in areas up gradient along Sacramento wash that could impact the groundwater source? For example can mining occur there?	See above		See above	To ensure that water quality degradation does not occur in the HNRW1 freshwater source aquifer over the lifetime of the remedy, the Tribes request that water quality data from Topock wells 2 and 3 are included in future groundwater monitoring reports.	See 276 above

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					Wash upstream of HNWR-1 for source water protection is not considered warranted. The Topock-2 and -3 wells are located between HNWR-1A and the former area with rusty cans and other metal debris, so in the unlikely event that groundwater contaminants are migrating from this area, they would be expected to be detected first at Topock-2 and -3.						
280	FMIT/TRC	Non-design	Request for Information	3.3.2.1 p. 3-40 Uncertainties and Assumptions - Source Water Assessment	At DTSC's request and per resolution of 60% RTC #161 DTSC-60, the MW-55 well cluster will be sampled periodically as data at this location could have some value in detecting contaminants	Will monitoring data from wells MTS1 and MTS2 be included?	Yes, see Section 5.4 (Monitoring for Domestic/Private Wells) of the Sampling and Monitoring Plan (Volume 2 of the O&M Manual).			Noted.	
281	Hualapai/TRC	Non-design	Request for Information	3.3.2.1 p. 3-40 Uncertainties and Assumptions - Source Water Assessment	At DTSC's request and per resolution of 60% RTC #161 DTSC-60, the MW-55 well cluster will be sampled periodically as data at this location could have some value in detecting contaminants	Will monitoring data from wells MTS1 and MTS2 be included?	See above			Noted.	
282	Cocopah/TRC	Non-design	Request for Information	3.3.2.1 p. 3-40 Uncertainties and	At DTSC's request and per resolution of 60% RTC	Will monitoring data from wells MTS1 and MTS2 be included?	See above			Noted.	

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				Assumptions - Source Water Assessment	#161 DTSC-60, the MW-55 well cluster will be sampled periodically as data at this location could have some value in detecting contaminants						
283	Chemehuevi/ TRC	Non-design	Request for Information	3.3.2.1 p. 3-40 Uncertainties and Assumptions - Source Water Assessment	At DTSC's request and per resolution of 60% RTC #161 DTSC-60, the MW-55 well cluster will be sampled periodically as data at this location could have some value in detecting contaminants	Will monitoring data from wells MTS1 and MTS2 be included?	See above			Noted.	
284	DTSC-72	Design	Contingencies	3.3.3 Design Basis for Freshwater Supply System/ Page 3-41	"Extraction well or well(s) in Arizona (HNWR-1A well is the primary freshwater supply well with HNWR-1 as the secondary supply well, and Topock 2/3 and Site B as ~~the~~ contingent supply wells if needed)"	Revise text as noted in the column to the left.	Text will be revised as requested.	Resolved.			Comment resolved.
285	DTSC-73	Design	Contingencies	3.3.3 Design Basis for Freshwater Supply System/ Page 3-42	EXHIBIT 3.3-4 "As a primary contingency, Topock 2/3 can augment supply. As a secondary contingency, provisions (i.e., additional piping, power supply, and aboveground water infrastructure) are included in the 90% design to allow for Site B to be	Revise text as noted in column to the left. Why would one build significant infrastructure to Site B when infrastructure essentially already exits at Topock2/3 where the water quality is superior?	Revision to text will be made as requested. As mentioned in RTC #135 DTSC-67, in order to separate the freshwater supply for TCS and remedy and ensure that the use of the infrastructure designed and constructed under this project is prioritized for remedy use first, the tie-in of Topock-2 and -3 wells was eliminated in the 90% design (see 60% RTC 168 DTSC-63). However, Topock-2 and -3 wells can be tied in	Resolved.			Comment resolved.

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					brought online to supplement any shortage in flow if needed.”		with added infrastructure within the Compressor Station footprint. In response to DTSC’s request, additional details that describe this tie-in was provided for review during the 90% RTC period and included in **Attachment E** of the final RTC table. If there is a competing need for Topock-2 and -3 water in the future, the first priority for this water, as noted in 60% RTC 168 DTSC-63, is for fire protection and operational needs at the Station, and that priority cannot be changed.				
286	DTSC-74	Design	Remedial design	3-42	Exhibit 3.3-4, Water Pipe Based upon this design approach, no cathodic protection is required.	Conflicting statement issue: App C 5.1 Corrosion Control states above and below ground steel pipe will be coated. Any steel pipe near the point where it emerges from the ground will be coated. Air-to-soil transition piping is any steel piping located 18" below ground or 6" above ground. Cathodic protection equipment will be applied as follows: 1) steel piping and structures will be cathodically protected underground; 2) plastic pipe will be preferentially used when appropriate for corrosion resistance; and 3) steel pipe will be cement mortar-lined to prevent internal corrosion. The text above seems to contradict this revision in Exhibit 3.3-4 from RTC #173. Either change BOD 3.3.3.1 (and other similar sections dealing with corrosion protection for steel pipe) to conform to the requirements for cathodic protection in Appendix C or change the requirements and explain/justify why cathodic protection is not necessary in Appendix C.	The text in section C.5.1 will be revised to clarify where cathodic protection is necessary as opposed to other listed corrosion control needs.	Resolved.			Comment resolved.
287	DTSC-75	Design	Remedial design	3.3.3 Design Basis for Freshwater Supply System/ Page 3-43	“As a result of its evaluation, PG&E recommended modifications to select structural members of the Arched Bridge (see Appendix G). PG&E Gas Transmission, as the entity responsible for the pipe bridge within the PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the Arched Bridge.”	There is some concern with the lack of progress on the recommended structural modifications as this item has lingered for some time. What are the issues and is there a problem? What is the schedule for completing discussions? Modification of the Arched Bridge will need to be considered in the upcoming CEQA evaluation. Although PG&E does not believe the bridge modification to be remedy related, the bridge will carry remedy components and should be considered, at a minimum, a cumulative impact evaluation.	PG&E and Kinder Morgan are working through the details regarding bridge modification. It is anticipated that the bridge modification will commence in late 2015; completion is scheduled for April 2016. PG&E will keep the agencies updated on the progress. The Arched Bridge modification is a PG&E Gas Transmission project and has independent utility from the Project. The project is being completed to add lateral support to the bridge. PG&E defers to DTSC on how it may consider the modifications in future cumulative impact	Okay.			Comment resolved.

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							analysis under CEQA.				
288	FMIT/TRC 1i	Non-design	Request for Information	3.3.3.1 Freshwater Supply Piping Network	PG&E has also completed its own structural evaluation of the capacity of the Arched Bridge to support the 12-inch water line and to check for current design codes. As a result of its evaluation, PG&E recommended modifications to select structural members of the Arched Bridge (see Appendix G). PG&E Gas Transmission, as the entity responsible for the pipe bridge within the PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the Arched Bridge.	Please indicate when in the design process will these discussions be finalized? Is there any chance of significant design modifications?	As mentioned in the 60% RTC #468 (FMIT-143, Hualapai-116, Chemehuevi-116, Cocopah-116, CRIT-116), PG&E Gas Transmission is the entity responsible for the pipe bridge within PG&E organization. Any follow-on pipeline bridge improvement project will be a Gas Transmission project, therefore, will not be discussed in the remedy design documents. Consistent with current practice, PG&E will keep the agencies, stakeholders, and Tribes informed of Gas Transmission projects in the Topock area.		Response noted.	Please see response to comment FMIT/TRC RTC #44.	DTSC response: Tribal comment noted.
289	Hualapai/TRC 1i	Non-design	Request for Information	3.3.3.1 Freshwater Supply Piping Network	PG&E has also completed its own structural evaluation of the capacity of the Arched Bridge to support the 12-inch water line and to check for current design codes. As a result of its evaluation, PG&E recommended modifications to select structural members of the Arched Bridge (see	Please indicate when in the design process will these discussions be finalized? Is there any chance of significant design modifications?	See above		See above	See response to comment Hualapai/TRC RTC #83.	DTSC response: Tribal comment noted.

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					Appendix G). PG&E Gas Transmission, as the entity responsible for the pipe bridge within the PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the Arched Bridge.						
290	Cocopah/TRC 1i	Non-design	Request for Information	3.3.3.1 Freshwater Supply Piping Network	PG&E has also completed its own structural evaluation of the capacity of the Arched Bridge to support the 12-inch water line and to check for current design codes. As a result of its evaluation, PG&E recommended modifications to select structural members of the Arched Bridge (see Appendix G). PG&E Gas Transmission, as the entity responsible for the pipe bridge within the PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the Arched Bridge.	Please indicate when in the design process will these discussions be finalized? Is there any chance of significant design modifications?	See above		See above	See response to Cocopah RTC #84.	DTSC response: Tribal comment noted.
291	Chemehuevi/ TRC 1i	Non-design	Request for Information	3.3.3.1 Freshwater Supply Piping Network	PG&E has also completed its own structural evaluation of the capacity of the Arched	Please indicate when in the design process will these discussions be finalized? Is there any chance of significant design modifications?	See above		See above	See Chemehuevi/TRC RTC #85.	DTSC response: Tribal comment noted.

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					Bridge to support the 12-inch water line and to check for current design codes. As a result of its evaluation, PG&E recommended modifications to select structural members of the Arched Bridge (see Appendix G). PG&E Gas Transmission, as the entity responsible for the pipe bridge within the PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the Arched Bridge.						
292	FMIT/TRC 1j	Design	CEQA/EIR	3.3.3.3 Freshwater Injection Wells	Consideration will be given to installation of an additional well to ensure that sufficient injection capacity is available for the life of the remedy. If the low capacity of the well appears to be due to low permeability in the aquifer, the new well should be located some distance away from the existing well in hopes of finding better aquifer materials. Any additional wells needed to achieve this	Please indicate what level of Tribal consultation and collaboration will occur when deciding replacement well locations. While Tribes be consulted in a manner similar to which has occurred during the drafting of the Remedial Design BOD reports?	Please see RTCs #44 FMIT/TRC, #45 Hualapai/ TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC for discussion of communication with Tribes during construction, startup, and O&M. In addition, PG&E will notify and invite Tribal monitors to monitor and observe ground disturbing activities in accordance with the PA, the CHPMP, and the CIMP, e.g., tribal notification prior to certain activities and Tribal monitoring/ observation of ground disturbing activities (PA Appendix B, CHPMP Section 6, and CIMP section 2.10).			Please see response to comment FMIT/TRC RTC #44.	DTSC response: Tribal comment noted.

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					capacity would be installed in the same area as the primary well. Well drilling at any one area would only continue until this target of three times the design capacity was reached. There is also a possibility that the design flow rates for individual well locations could be adjusted to allow for somewhat more injection in the higher permeability locations and somewhat less injection in the lower permeability locations. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity						
293	Hualapai/TRC 1j	Design	CEQA/EIR	3.3.3.3 Freshwater Injection Wells	Consideration will be given to installation of an additional well to ensure that sufficient injection capacity is available for the life of the remedy. If the low capacity of the well appears to be due to low permeability in the aquifer, the new well should be located some distance away from the	Please indicate what level of Tribal consultation and collaboration will occur when deciding replacement well locations. While Tribes be consulted in a manner similar to which has occurred during the drafting of the Remedial Design BOD reports?	See above			See response to comment Hualapai/TRC RTC #83.	DTSC response: Tribal comment noted.

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					existing well in hopes of finding better aquifer materials. Any additional wells needed to achieve this capacity would be installed in the same area as the primary well. Well drilling at any one area would only continue until this target of three times the design capacity was reached. There is also a possibility that the design flow rates for individual well locations could be adjusted to allow for somewhat more injection in the higher permeability locations and somewhat less injection in the lower permeability locations. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity						
294	Cocopah/TRC A1j	Design	CEQA/EIR	3.3.3.3 Freshwater Injection Wells	Consideration will be given to installation of an additional well to ensure that sufficient injection capacity is available for the life of the remedy. If the low capacity of the well	Please indicate what level of Tribal consultation and collaboration will occur when deciding replacement well locations. While Tribes be consulted in a manner similar to which has occurred during the drafting of the Remedial Design BOD reports?	See above			See response to Cocopah RTC #84.	DTSC response: Tribal comment noted.

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					appears to be due to low permeability in the aquifer, the new well should be located some distance away from the existing well in hopes of finding better aquifer materials. Any additional wells needed to achieve this capacity would be installed in the same area as the primary well. Well drilling at any one area would only continue until this target of three times the design capacity was reached. There is also a possibility that the design flow rates for individual well locations could be adjusted to allow for somewhat more injection in the higher permeability locations and somewhat less injection in the lower permeability locations. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity						
295	Chemehuevi/ TRC 1j	Design	CEQA/EIR	3.3.3.3 Freshwater Injection Wells	Consideration will be given to installation of an additional well to ensure	Please indicate what level of Tribal consultation and collaboration will occur when deciding replacement well locations. While Tribes be consulted in a manner similar to which has occurred during the drafting of the Remedial Design BOD reports?	See above			See Chemehuevi/TRC RTC# 85.	DTSC response: Tribal comment noted.

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Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					that sufficient injection capacity is available for the life of the remedy. If the low capacity of the well appears to be due to low permeability in the aquifer, the new well should be located some distance away from the existing well in hopes of finding better aquifer materials. Any additional wells needed to achieve this capacity would be installed in the same area as the primary well. Well drilling at any one area would only continue until this target of three times the design capacity was reached. There is also a possibility that the design flow rates for individual well locations could be adjusted to allow for somewhat more injection in the higher permeability locations and somewhat less injection in the lower permeability locations. In sum, there may be more than one well installed at the FW or IRL well locations initially to						

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					ensure sufficient capacity						
296	FMIT/TRC	Design	Request for Information	3.3.3.1 Figure 3.3-1 Freshwater Supply Piping Network	In the event that pre-treatment of fresh water is required, all fresh water will be piped to the Compressor Station for treatment, and the treated fresh water will be conveyed along the entrance road prior to joining the freshwater pipeline along	Please discuss how pipeline runs will be modified in the case that pre-treatment is required. How much new pipeline and/or trenching will be required. What will the new flow paths be in the case that pre-treatment is required?	The final design will be changed to accommodate a new 12” pipe parallel to the planned Pipeline B pipe leading to the TCS along PG&E’s natural gas pipeline right of way (ROW). The design details were presented during the 90% RTC period and included in **Attachment I** of the final RTC table. This new pipe will be installed concurrent with remedy construction to convey treated freshwater in the event pre-treatment is required. The pipe will be directly buried and installed such that the width of the pipe trench remains about the same as in the 90% (Drawing C-07-103). This new 12” pipe will turn north and connect to the branch that runs north (Pipeline J as shown on Drawing C-07-02) toward National Trails Highway and the uplands freshwater injection wells. The valve box currently shown in the 90% drawings (C-07-69) will be enlarged to allow for the new pipe connections and additional valves to control flow. The text from Section 3.3.3.1 with changes indicated in underline and strikeout. “After crossing the Colorado River into California, the water pipeline will follow PG&E’s natural gas pipeline ROW to the remedy freshwater storage tank. Midway along the PG&E’s natural gas pipeline ROW, the freshwater pipeline will			The incorporation of design accommodations for possible future additional pipeline runs, while planned for in existing trenches, represents an incremental, and potentially significant, expansion of underground piping that needs to be addressed in the SEIR.	DTSC response: Tribal comment noted.

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							branch to the north to connect to the piping corridor located near NTH and the Compressor Station entrance road. In the event that pre-treatment of fresh water is required, all fresh water will be piped to the Compressor Station for treatment, and the treated fresh water will be conveyed along PG&E's natural gas pipeline ROW ~~entrance road~~ prior to joining the freshwater pipeline ~~along~~ leading to NTH. The treated freshwater pipe will be installed concurrent with construction of the untreated freshwater pipe (i.e., Pipeline B)."				
297	Hualapai/TRC	Design	Request for Information	3.3.3.1 Figure 3.3-1 Freshwater Supply Piping Network	In the event that pre-treatment of fresh water is required, all fresh water will be piped to the Compressor Station for treatment, and the treated fresh water will be conveyed along the entrance road prior to joining the freshwater pipeline along	Please discuss how pipeline runs will be modified in the case that pre-treatment is required. How much new pipeline and/or trenching will be required. What will the new flow paths be in the case that pre-treatment is required?	See above			The incorporation of design accommodations for possible future additional pipeline runs, while planned for in existing trenches, represents an incremental expansion of underground piping that needs to be addressed in the SEIR.	DTSC response: Tribal comment noted.
298	Cocopah/TRC	Design	Request for Information	3.3.3.1 Figure 3.3-1 Freshwater Supply Piping Network	In the event that pre-treatment of fresh water is required, all fresh water will be piped to the Compressor Station for treatment, and the treated fresh water will be conveyed along the entrance road prior to joining the freshwater	Please discuss how pipeline runs will be modified in the case that pre-treatment is required. How much new pipeline and/or trenching will be required. What will the new flow paths be in the case that pre-treatment is required?	See above			The incorporation of design accommodations for possible future additional pipeline runs, while planned for in existing trenches, represents an incremental expansion of underground piping that needs to be addressed in the SEIR.	DTSC response: Tribal comment noted.

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					pipeline along						
299	Chemehuevi/ TRC	Design	Request for Information	3.3.3.1 Figure 3.3-1 Freshwater Supply Piping Network	In the event that pre-treatment of fresh water is required, all fresh water will be piped to the Compressor Station for treatment, and the treated fresh water will be conveyed along the entrance road prior to joining the freshwater pipeline along	Please discuss how pipeline runs will be modified in the case that pre-treatment is required. How much new pipeline and/or trenching will be required. What will the new flow paths be in the case that pre-treatment is required?	See above			The incorporation of design accommodations for possible future additional pipeline runs, while planned for in existing trenches, represents an incremental expansion of underground piping that needs to be addressed in the SEIR	DTSC response: Tribal comment noted.
300	DTSC-77	Design	Contingencies	3-51	Sub-section 3.3.3.2 and 3.3.3.3 As discussed in RTC #168 DTSC-63, to ensure first priority for remedy use and after further evaluation of the additional controls, instrumentation, and tank upgrades that would need to be installed in the existing tanks in order to harmonize various demand for freshwater, PG&E now proposes to separate the freshwater supply storage for the remedy and the Compressor Station in the 90% design. A separate and smaller tank (10,000 gallons) will be installed inside the Compressor	The new storage tank for remedy only use of freshwater is 10,000 gallons. At the maximum total injection rate of 900 gpm the tank will empty in 11 minutes. Even at the nominal injection rate the reserve is severely limited. The issue of reserve capacity was brought up in the 60% RTC. The 60% RTC states 7-27 hours of reserve for injection wells is available based on the then 420,000 gallons of storage (TCS supply tanks for operations). The BOD states injection of freshwater is needed to provide hydraulic control to prevent migration of the chromium plume beyond the identified boundaries. Given the reduction in storage capacity with the modified design, a contingency should be included in the BOD (App L, vol. 3 seems appropriate) to ensure adequate supply to the injection wells in the event the freshwater supply is interrupted.	The provision to tie-in ~~of~~ Topock-2 and 3 wells, via the existing 6-inch supply line~~, TCS freshwater storage tanks, to the Remedy freshwater storage tank~~ will essentially supplement the remedy freshwater flow by an amount that equals to the supply flow rate from the wells minus any usage by the Compressor Station at that time ~~of increase the total storage capacity of freshwater up to 430,000 gallons (maximum)~~. If there is a short term loss of the freshwater source (on the order of days or weeks) it is not likely hydraulic control of the plume will be lost as the average groundwater velocities are still relatively slow and the natural ambient gradient is still from west to east, which would limit the potential for plume migration beyond the plume boundaries. As this is a long term remedial approach, short term down periods of the freshwater injection wells will not have a significant impact on the longer term	Resolved.			Comment resolved.

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					Station for remedy use only and will be supplied by well HNWR-1A from Arizona.		regional hydraulic gradients. In the case of FW-2, the operational rate of the TCS Injection Loop can also potentially be adjusted to minimize the potential for westward expansion of the plume due to TCS injection. Additional details regarding this tie-in were provided for review during the 90% RTC period and included in **Attachment E** of the final RTC table.				
301	FMIT/TRC	Non-design	Request for Information	3.3.3.2 Page 3-44 Freshwater Supply Storage	An analysis of the fire protection water system hydraulic performed at the 60% design stage suggested that there is adequate storage capacity to meet the fire flow storage requirement that can be shared with the remedy, as long as there is sufficient supply	Please state exactly the quantity needed for fire flow storage, how is this quantity affected if more injection wells are added? What is considered sufficient supply?	The maximum fire water demand is 642 gallons per minute for remedy facilities on the MW-20 Bench and TW Bench (see “MW-20 Bench and TW Bench Carbon Amendment Buildings Fire Suppression Calculations” in Attachment B of Appendix C). Typically, volumetric demand is based on one hour flow, so this would result in 38,520 gallons. This demand is much smaller than the combined storage capacity of 420,000 gallons of the existing TCS freshwater storage tanks, therefore, supply of fire protection water for remedy facilities is adequate. As mentioned in 60% RTC #168 DTSC-163, to ensure first priority for remedy use and after further evaluation of the additional controls, instrumentation, and tank upgrades needed to be installed in the existing TCS tanks in order to harmonize various demand for freshwater, PG&E had proposed to separate the freshwater supply storage for the operation of the remedy and the Compressor		Response noted.	Noted.	

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							Station in the 90% design. As a result, PG&E designed a separate and smaller tank (10,000 gallons) inside the Compressor Station for remedy use only and the tank will be supplied by well HNWR-1A from Arizona. Fire protection water for the remedy facilities will continue to be supplied by the existing TCS freshwater storage tanks. Therefore, the fire protection water storage volume will not be affected if more injection wells are added.				
302	Hualapai/TRC	Non-design	Request for Information	3.3.3.2 Page 3-44 Freshwater Supply Storage	An analysis of the fire protection water system hydraulic performed at the 60% design stage suggested that there is adequate storage capacity to meet the fire flow storage requirement that can be shared with the remedy, as long as there is sufficient supply	Please state exactly the quantity needed for fire flow storage, how is this quantity affected if more injection wells are added? What is considered sufficient supply?	See above		See above	Noted.	
303	Cocopah/TRC	Non-design	Request for Information	3.3.3.2 Page 3-44 Freshwater Supply Storage	An analysis of the fire protection water system hydraulic performed at the 60% design stage suggested that there is adequate storage capacity to meet the fire flow storage requirement that can be shared with the	Please state exactly the quantity needed for fire flow storage, how is this quantity affected if more injection wells are added? What is considered sufficient supply?	See above		See above	Noted.	

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					remedy, as long as there is sufficient supply						
304	Chemehuevi/ TRC	Non-design	Request for Information	3.3.3.2 Page 3-44 Freshwater Supply Storage	An analysis of the fire protection water system hydraulic performed at the 60% design stage suggested that there is adequate storage capacity to meet the fire flow storage requirement that can be shared with the remedy, as long as there is sufficient supply	Please state exactly the quantity needed for fire flow storage, how is this quantity affected if more injection wells are added? What is considered sufficient supply?	See above		See above	Noted.	
305	FMIT/TRC	Design	Remedial Design	3.3.3.3 p. 3-45 Freshwater Injection Wells	If the low capacity of the well appears to be due to low permeability in the aquifer, the new well should be located some distance away from the existing well in hopes of finding better aquifer materials. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity.	This seems open-ended and unrestricted. Would there be a limit to how many wells are drilled in one location? Groundwater model pathlines show that it could take 10-15 years for IRL injections to reach the IRZ line. How long would it take to make these decisions? Please describe how the Tribes might be included in the decision-making process.	We are anticipating that only one well per location will be needed. However if geologic conditions are different than anticipated then an additional one or two wells could be required to meet the design injection rate. The decision to install more than one well will be based on the field observations of geology during well installation and the injectivity testing results not on the travel time to the IRZ line of wells. If more than one well is required to meet the design injection rate then communication procedures and protocols presented in Table 2.3-1 of the C/RAWP and Exhibit L2.2-1 of the O&M Manual will be initiated. The communication procedures and protocols in the O&M Manual are intended to be used by the PG&E Topock project team to			If geologic conditions are different, which requires additional injection wells, in order to achieve the greatest remediation efficiency shouldn't the wells be spread out rather than placed in one location? If more than one injection well is needed per injection site, will there be more than one trench, more than one pipeline, more than one electrical line, more than one solar panel, more than one access road, etc.? If more than one injection well is needed per injection site, then it means that the aquifer does not accept injection as readily as presented in the conceptual model, and extreme groundwater mounding could occur nearest to these grouped injection wells, possibly allowing water to escape to the surface through un-	DTSC Response: DTSC agrees that there may be a possibility for additional infrastructures based on site observation as the remedy is constructed. DTSC will consider contingencies in the SEIR. As stated in PG&E's response, communication procedures and protocols in the design document (specifically, the O&M manual) will be followed. PG&E Response: The design for freshwater injection is based on information deemed reliable for determining the likely number of wells needed to achieve and sustain the necessary injection rates. This information includes knowledge of the

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							inform and/or seek input from agencies, stakeholders, and Tribes; to seek approvals from agencies; to resolve issues; and to comply with certain requirements. The communication procedures and protocols in the O&M Manual are a compilation of PG&E's obligations for formal communication to certain parties during this phase of work that is specified in various directives from, and agreements with, State and Federal Agencies, state and federal laws, Memoranda of Understanding ("MOUs") with certain Tribes, the 2006 Settlement Agreement with the FMIT, and other required project documents.			natural springs and arroyos. Proposed placement of multiple injection wells in one location needs to be addressed as part of the Subsequent Groundwater EIR. Comment unresolved.	aquifer materials from borehole data in the uplands and also the performance of freshwater injection as part of the IM-3 system. However, it is common practice to have a contingency for additional wells if aquifer testing associated with new injection well installation indicates that additional wells will be required. If additional wells are required, communication procedures and protocols as previously referenced will be followed, and attempts will be made to minimize additional infrastructure.
306	Hualapai/TRC	Design	Remedial Design	3.3.3.3 p. 3-45 Freshwater Injection Wells	If the low capacity of the well appears to be due to low permeability in the aquifer, the new well should be located some distance away from the existing well in hopes of finding better aquifer materials. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity.	This seems open-ended and unrestricted. Would there be a limit to how many wells are drilled in one location? Groundwater model pathlines show that it could take 10-15 years for IRL injections to reach the IRZ line. How long would it take to make these decisions? Please describe how the Tribes might be included in the decision-making process.	See above			If geologic conditions are different, which requires additional injection wells, in order to achieve the greatest remediation efficiency shouldn't the wells be spread out rather than placed in one location? If more than one injection well is needed per injection site, will there be more than one trench, more than one pipeline, more than one electrical line, more than one solar panel, more than one access road, etc.? If more than one injection well is needed per injection site, then it means that the aquifer does not accept injection as readily as presented in the conceptual model, and extreme groundwater mounding could occur nearest to these	DTSC response: See 305 above

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										grouped injection wells, possibly allowing water to escape to the surface through un-natural springs and arroyos. Proposed placement of multiple injection wells in one location needs to be addressed as part of the Subsequent Groundwater EIR. Comment unresolved.	
307	Cocopah/TRC	Design	Remedial Design	3.3.3.3 p. 3-45 Freshwater Injection Wells	If the low capacity of the well appears to be due to low permeability in the aquifer, the new well should be located some distance away from the existing well in hopes of finding better aquifer materials. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity.	This seems open-ended and unrestricted. Would there be a limit to how many wells are drilled in one location? Groundwater model pathlines show that it could take 10-15 years for IRL injections to reach the IRZ line. How long would it take to make these decisions? Please describe how the Tribes might be included in the decision-making process.	See above			If geologic conditions are different, which requires additional injection wells, in order to achieve the greatest remediation efficiency shouldn't the wells be spread out rather than placed in one location? If more than one injection well is needed per injection site, will there be more than one trench, more than one pipeline, more than one electrical line, more than one solar panel, more than one access road, etc.? If more than one injection well is needed per injection site, then it means that the aquifer does not accept injection as readily as presented in the conceptual model, and extreme groundwater mounding could occur nearest to these grouped injection wells, possibly allowing water to escape to the surface through un-natural springs and arroyos. Proposed placement of multiple injection wells in one location needs to be addressed as part of the Subsequent Groundwater EIR. Comment unresolved.	DTSC response: See 305 above
308	Chemehuevi/ TRC	Design	Remedial Design	3.3.3.3 p. 3-45 Freshwater Injection Wells	If the low capacity of the well appears to be due to low	This seems open-ended and unrestricted. Would there be a limit to how many wells are drilled in one location? Groundwater model pathlines show that it could take 10-15 years for IRL injections to reach the IRZ line. How long would it take to make these decisions? Please describe how the Tribes might be included in the decision-making process.	See above			If geologic conditions are different, which requires additional injection wells, in order	DTSC response: See 305 above

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					permeability in the aquifer, the new well should be located some distance away from the existing well in hopes of finding better aquifer materials. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity.					to achieve the greatest remediation efficiency shouldn't the wells be spread out rather than placed in one location? If more than one injection well is needed per injection site, will there be more than one trench, more than one pipeline, more than one electrical line, more than one solar panel, more than one access road, etc.? If more than one injection well is needed per injection site, then it means that the aquifer does not accept injection as readily as presented in the conceptual model, and extreme groundwater mounding could occur nearest to these grouped injection wells, possibly allowing water to escape to the surface through un-natural springs and arroyos. Proposed placement of multiple injection wells in one location needs to be addressed as part of the Subsequent Groundwater EIR. Comment unresolved.	
309	FMIT/TRC	Design	CEQA/EIR	3.3.3.3 p. 3-45 Freshwater Injection Wells	Consideration will be given to installation of an additional well to ensure that sufficient injection capacity is available for the life of the remedy. If the low capacity of the well appears to be due to low permeability in the aquifer, the new well should be located some distance away	If numerous wells are installed in one location how will this be reflected in the total EIR well count? Will this be considered one well or numerous wells?	The design for the freshwater injection wells only includes one well per location (FW-1 and FW-2), but acknowledges that if sufficient injectivity cannot be achieved at a given location with one well then additional wells may be required. The injection wells will be constructed and operated according to industry best practices to maximize well effectiveness (i.e., injectivity) and lifetime. That said, the geologic conditions at a given location might limit the		DOI defers to DTSC regarding well count.	The Tribe disagrees with the agency rational that replacement wells installed in the vicinity of an abandoned, once operable well do not increase the total remedy well count: It is the additional environmental impact that is potentially significant, not just an abstract numerical increase. The Tribe would like to reiterate that the groundwater remedial infrastructure is being installed in a Sacred landscape and any additional borehole	RTCs related to well count were discussed at the July 23 and August 18 TWG meetings. DTSC response: DTSC has clarified for years that the well count considered in the 2011 FEIR was provide by PG&E during the conceptual stage of the remedy. DTSC has since the 2011 FEIR (as early as August 2013 as comment to the 60% design), clarified in CTF meetings, CWG

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					from the existing well in hopes of finding better aquifer materials. Any additional wells needed to achieve this capacity would be installed in the same area as the primary well. Well drilling at any one area would only continue until this target of three times the design capacity was reached. There is also a possibility that the design flow rates for individual well locations could be adjusted to allow for somewhat more injection in the higher permeability locations and somewhat less injection in the lower permeability locations. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity		effectiveness of an injection well, and it might be determined that additional injection wells are required for proper remedy operation. In this scenario, it is expected that these additional wells, which would be identified in the construction or early O&M phase of the project, would be counted as new boreholes. Alternatively, if the initial injection well(s) are determined sufficient for proper remedy operation but become inoperable over time during the O&M period, such as through clogging or damage, then replacement wells might be required. The FEIR defines the process for establishing a replacement well in that the existing well would be abandoned and replaced with an entirely new well. The new well would be located close to the existing well, within the areas currently designated in the EIR (see Exhibit 3-4 of the FEIR). Unless the new well encountered different geologic conditions and/or has significantly smaller capacity than the well it replaced, there would be no net change in the total number of existing wells. If the new well has significantly smaller capacity, it might be necessary to replace an existing well with two new wells under certain conditions. Replacement wells put in the same location as original wells were not counted as additions to the estimated number of wells disclosed in the			placed in the ground is considered a significant impact to cultural resources. All wells regardless of use, name, or placement should be included in the overall well count. In addition, any increased number of allowable wells that may occur in the future SEIR is a continuation of project scope creep that has occurred throughout the groundwater remedy design process without apparent significant concern for the effect on a unique archeological and historically significant resource.	meetings, TWG meetings and in 60% RTCs (see RTC #228 and #632 from 60% design) that the design must be based on identified purpose and need, and not the borehole constraints stated in the FEIR. DTSC has committed to conducting an SEIR for additional wells identified.

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							EIR.				
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					more injection in the higher permeability locations and somewhat less injection in the lower permeability locations. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity						
312	Chemehuevi/ TRC	Design	CEQA/EIR	3.3.3.3 p. 3-45 Freshwater Injection Wells	Consideration will be given to installation of an additional well to ensure that sufficient injection capacity is available for the life of the remedy. If the low capacity of the well appears to be due to low permeability in the aquifer, the new well should be located some distance away from the existing well in hopes of finding better aquifer materials. Any additional wells needed to achieve this capacity would be installed in the same area as the primary well. Well drilling at any one area would only continue until this target of three times the design capacity was reached. There	If numerous wells are installed in one location how will this be reflected in the total EIR well count? Will this be considered one well or numerous wells?	See above		See above	The Tribes disagree with the agency rational that replacement wells installed in the vicinity of an abandoned, once operable well does not increase the total remedy well count. The Tribes would like to reiterate that the groundwater remedial infrastructure is being installed in a Sacred landscape and any additional borehole placed in the ground is considered a significant impact to cultural resources. All wells, regardless of use, name, or placement should be included in the overall well count. In addition, any increased number of allowable wells that may occur in the future SEIR is a continuation of project scope creep that has occurred throughout the groundwater remedy design process without an apparent concern for the effect on a unique archeological and historically significant resource.	RTCs related to well count were discussed at the July 23 and August 18 TWG meetings. DTSC Response: See RTC #309 above.

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					is also a possibility that the design flow rates for individual well locations could be adjusted to allow for somewhat more injection in the higher permeability locations and somewhat less injection in the lower permeability locations. In sum, there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity						
313	DTSC-76	Design	Monitoring	3.4.1 Transportation /3.4.2 Reuse/Disposal Options and Conditioning	Page 3-49 – "Because the characteristics of the rehabilitation wastewater may not be known until it is pumped back out of the well,..." Page 3-50 – "If the water is to be injected back into the plume through the IRZ Injection Wells, it is assumed the water would need to be conditioned to a degree where it would not contribute to the fouling of the injection wells or disruption of the natural geochemistry in the aquifer near the	Injection of conditioned wastewater is stated to be concerned with impacts to 1) well fouling and 2) the natural geochemistry, but not degradation of the aquifer. It is appropriate to understand what the conditioned wastewater contains and develop a monitoring plan to ensure adverse aquifer impacts are not encountered. Revised language is provided below: "If the water is to be injected back into the plume through the IRZ Injection Wells, it is assumed the water would need to be conditioned to a degree where it would not adversely impact the aquifer or contribute to the fouling of the injection wells or disruption of the natural geochemistry in the aquifer near the injection wells (see Section 3.4.2.2 for a discussion of conditioning)." It is noted that Section 3.4.2.2 (first bullet and last paragraph of page 3-54) acknowledges aquifer protection.	Section 5.3 of the Sampling and Monitoring Plan (O&M Manual Volume 2) describes the program that will be implemented to monitor the quality of influent and effluent (or conditioned) water at the Remedy-produced Water Conditioning Plant. Table 5.3-1 lists the sampling analytes and frequency. Exhibit 5.3-1 shows the proposed influent and effluent monitoring locations. Note that the sampling location (SP-372A) will be moved to the effluent of Tank 510 in the final design. The revised exhibit was included in **Attachment J** of the final RTC table. Revision to text will be made as requested.	Resolved.			Comment resolved.

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					injection wells (see Section 3.4.2.2 for a discussion of conditioning)."						
314	DTSC-78	Design	Editorial	3.4.2 Reuse/ Disposal Options and Conditioning/ Page 3-52	EXHIBIT 3.4-2 "The agitator and pumps will be powered by 120/240 VAC generated by a generator operating on natural gas or by direct connection to the compressor station power system. If the generator is installed, it will be in a small building inside the pond fence line that also includes a control panel and a bank of batteries. Natural gas for the generator will be piped from the PG&E transmission line 300B, approximately 500 feet away. A new regulator rack will be installed to reduce the gas line pressure from line pressure down to the operating level of the generator. If the power is supplied directly from the compressor station power system, the new electrical conductors will be installed along the right-of-way that currently	Footnote "a" text will need to be revised to support the selected power supply option.	Footnote "a" text will be revised to reflect the power supply information provided in the revised portion of Table ES-1 included in the Supplemental 90%.	Resolved.			Comment resolved.

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					contains the discharge pipeline that carries water from the compressor station to the ponds. A small control building or panel would be installed to house the pond controls and communications equipment. PG&E is evaluating both options and will include the selected option in the Final (100%) design.”						
315	FMIT/TRC	Non-design	Request for Information	EXHIBIT 3.4-2 p. 3-52 Reuse/ Disposal Options and Associated Degree of Conditioning Required	Water accumulated in the ponds will evaporate over time. In the event the ponds are full (i.e., water level in the ponds reaches the maximum level allowed by the RWQCB), water can also be trucked off-site via the truck loading station at the ponds.	What type of storm water plan is in place to ensure that TCS wastewater ponds when full could not overflow during a storm event? Is the storm water plan adequate to address 100-year storm rainfall levels?	The current WDRs for the ponds require a minimum 2 feet of freeboard. In other words, the ponds when full have 2 feet additional capacity. Based on rainfall measurements at Needles Airport, a 100-year 24 hour storm could add up to 3.5 inches of water to the ponds. The ponds are surrounded by berms raised above surrounding grade so the additional volume of rain water introduced to the ponds would be limited to the area of the ponds and a portion of the top surface of the berms. Therefore, the TCS evaporation ponds have adequate capacity to address 100-year storm rainfall levels.			Noted.	
316	Hualapai/TRC	Non-design	Request for Information	EXHIBIT 3.4-2 p. 3-52 Reuse/ Disposal Options and Associated Degree of Conditioning Required	Water accumulated in the ponds will evaporate over time. In the event the ponds are full (i.e., water level in the ponds reaches the maximum level allowed	What type of storm water plan is in place to ensure that TCS wastewater ponds when full could not overflow during a storm event? Is the storm water plan adequate to address 100-year storm rainfall levels?	See above			Noted.	

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					by the RWQCB), water can also be trucked off-site via the truck loading station at the ponds.						
317	Cocopah/TRC	Non-design	Request for Information	EXHIBIT 3.4-2 p. 3-52 Reuse/ Disposal Options and Associated Degree of Conditioning Required	Water accumulated in the ponds will evaporate over time. In the event the ponds are full (i.e., water level in the ponds reaches the maximum level allowed by the RWQCB), water can also be trucked off-site via the truck loading station at the ponds.	What type of storm water plan is in place to ensure that TCS wastewater ponds when full could not overflow during a storm event? Is the storm water plan adequate to address 100-year storm rainfall levels?	See above			Noted.	
318	Chemehuevi/ TRC	Non-design	Request for Information	EXHIBIT 3.4-2 p. 3-52 Reuse/ Disposal Options and Associated Degree of Conditioning Required	Water accumulated in the ponds will evaporate over time. In the event the ponds are full (i.e., water level in the ponds reaches the maximum level allowed by the RWQCB), water can also be trucked off-site via the truck loading station at the ponds.	What type of storm water plan is in place to ensure that TCS wastewater ponds when full could not overflow during a storm event? Is the storm water plan adequate to address 100-year storm rainfall levels?	See above			Noted.	
319	DTSC-79	Design	Request for Information	Section 3.5.1, Electrical Power Supply, page 3-58, 1st paragraph	"Two new natural gas engine-driven generators with associated switchgear and auxiliary systems will be installed in the existing Auxiliary Building, which houses the existing generators and generator switchgear.	Will the two proposed new gas engine generators be used solely for the remedy and removed after remediation is complete? Or will this electrical generation also be used by the Compressor Station for power demand? Please note that PG&E must obtain permits (unless federal permit exemption applies for remediation only) and follow applicable regulations, including those from the APCD for these units, including compliance with emission offset/credit requirements.	The remedy electrical power will be supplied by the Compressor Station. The new natural gas generators will be part of the Compressor Station electrical power generation and will be used to meet the demand for gas operations. PG&E appreciates DTSC's note on permitting, and understand the requirements for these new generators.	Resolved.			Comment resolved.

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320	FMIT/TRC	Design	Infrastructures	3.5.1 p.3-58	Electrical Power Supply First paragraph	While it is possible that the new air compressor building will generate relatively low sound power levels in comparison to the other noise sources at the TCS, and that the new air compressors will generate less noise than the old compressors, the design documentation should inform all of the sound power levels of these new sources in the context of the sound power levels of existing sources at the TCS. These new noise sources should be included and quantified in Table D1-13 of Appendix D. Going forward in time, the TCS should implement a meaningful noise mitigation program to reduce TCS noise impacts on cultural and religious use of adjoining properties and parcels.	The TCS, including its new air compressor building, is not part of the project. Thus, it is not appropriate to include in the table of aboveground non-emergency remedy equipment (Table D1-13 in Appendix D). Although the TCS equipment may increase ambient noise levels, the project's contribution to cumulative noise impacts would remain as disclosed in the EIR. Additional mitigation measures, such as a noise mitigation program, to control noise from the TCS would lack a nexus to the proposed project.		Comment and response noted.	Just because TCS improvements, necessitated by and integral to the remedy project, may have some additional, future utility for TCS operations, it does not follow that the improvements are not included within the remedy project. It is the position of the Tribe that these improvements are indeed part of the remedy project. Therefore, this comment is considered unresolved. See also RTC 48 FMIT/TRC.	DTSC response: DTSC has deliberated on this matter with legal representatives of PG&E and determined that the TCS improvements are not specifically part of remedy infrastructures but must be considered in the cumulative impacts of the SEIR.
321	Hualapai/TRC	Design	Infrastructures	3.5.1 p.3-58	Electrical Power Supply First paragraph	While it is possible that the new air compressor building will generate relatively low sound power levels in comparison to the other noise sources at the TCS, and that the new air compressors will generate less noise than the old compressors, the design documentation should inform all of the sound power levels of these new sources in the context of the sound power levels of existing sources at the TCS. These new noise sources should be included and quantified in Table D1-13 of Appendix D. Going forward in time, the TCS should implement a meaningful noise mitigation program to reduce TCS noise impacts on cultural and religious use of adjoining properties and parcels.	See above		See above	Since TCS improvements, necessitated by and integral to the remedy project, may have some additional, future utility for TCS operations, it does not follow that the improvements are not included within the remedy project. It is the position of the Hualapai that these improvements are indeed part of the remedy project. Therefore, this comment is considered unresolved.	DTSC response: See RTC #320
322	Cocopah/TRC	Design	Infrastructures	3.5.1 p.3-58	Electrical Power Supply First paragraph	While it is possible that the new air compressor building will generate relatively low sound power levels in comparison to the other noise sources at the TCS, and that the new air compressors will generate less noise than the old compressors, the design documentation should inform all of the sound power levels of these new sources in the context of the sound power levels of existing sources at the TCS. These new noise sources should be included and quantified in Table D1-13 of Appendix D. Going forward in time, the TCS should implement a meaningful noise mitigation program to reduce TCS noise impacts on cultural and religious use of adjoining properties and parcels.	See above		See above	Just because TCS improvements, necessitated by and integral to the remedy project, may have some additional, future utility for TCS operations, it does not follow that the improvements are not included within the remedy project. It is the position of the Tribes that these improvements are indeed part of the remedy project. Therefore, this comment is considered unresolved.	DTSC response: See RTC #320

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323	Chemehuevi/ TRC	Design	Infrastructures	3.5.1 p.3-58	Electrical Power Supply First paragraph	While it is possible that the new air compressor building will generate relatively low sound power levels in comparison to the other noise sources at the TCS, and that the new air compressors will generate less noise than the old compressors, the design documentation should inform all of the sound power levels of these new sources in the context of the sound power levels of existing sources at the TCS. These new noise sources should be included and quantified in Table D1-13 of Appendix D. Going forward in time, the TCS should implement a meaningful noise mitigation program to reduce TCS noise impacts on cultural and religious use of adjoining properties and parcels.	See above		See above	Just because TCS improvements, necessitated by and integral to the remedy project, may have some additional, future utility for TCS operations, it does not follow that the improvements are not included within the remedy project. It is the position of the Tribes that these improvements are indeed part of the remedy project. Therefore, this comment is considered unresolved.	DTSC response: See RTC #320
324	FMIT/TRC	Non-design	Editorial	EXHIBIT 3.5 Remedy Buildings and Structures	Security equipment (cameras, intrusion alarms, card readers, etc.)	Please include nighttime lighting if this is intended to be used as a security measure	For the MW-20 Bench, nighttime access is not normally required. Exterior lights will be installed but activated manually. See Appendix C (Design Criteria), Section C.6.7.1 for additional details. For the TW Bench, exterior lighting is provided (for nighttime access) and is activated by photocells.			Noted.	
325	Hualapai/TRC	Non-design	Editorial	EXHIBIT 3.5 Remedy Buildings and Structures	Security equipment (cameras, intrusion alarms, card readers, etc.)	Please include nighttime lighting if this is intended to be used as a security measure	See above			Noted.	
326	Cocopah/TRC	Non-design	Editorial	EXHIBIT 3.5 Remedy Buildings and Structures	Security equipment (cameras, intrusion alarms, card readers, etc.)	Please include nighttime lighting if this is intended to be used as a security measure	See above			Noted.	
327	Chemehuevi/ TRC	Non-design	Editorial	EXHIBIT 3.5 Remedy Buildings and Structures	Security equipment (cameras, intrusion alarms, card readers, etc.)	Please include nighttime lighting if this is intended to be used as a security measure	See above			Noted.	
328	DTSC-80	Design	Request for Information	Section 3.5.3, Buildings/Structures for Major Equipment and Key Supporting Functions, page 3-60	"Major equipment associated with the in-situ remediation system includes… an air compressor,…"	Will PG&E utilize air compressors at the relocated air compressor aux building or a separate compressor located elsewhere for the project as stated? Please clarify and identify its location.	PG&E will not utilize the relocated air compressors for the remedy. There is a separate air compressor dedicated for the remedy. This remedy air compressor is located on the first floor of the Water Conditioning Plant for remedy-	Resolved.			Comment resolved.

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							produced water (see 90% drawing M-12-01). The remedy air compressor is designed to meet the noise design criteria stated in Section C.11 of Appendix C.				
329	FMIT/TRC	Non-design	Request for Information	3.5.4 Page 3-64 Site Safety and Security	PG&E's efforts will include coordinating with BLM to install signs that note the designation of the areas as an ACEC owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.	What enforceable trespassing laws are created under the placements of these signs? Is there any evidence that the posting of non-enforceable signs decreases visitor pressures? Will the wording and placement of signs be coordinated with the Tribes in anyway?	PG&E defers to DOI for response to the portion of the comment regarding trespassing laws and whether signs decrease visitor pressures on federal lands. Pursuant to Mitigation Measures CUL-1a-3, PG&E is required to enhance existing measures to prevent and reduce incursions from recreational and/or other outside users from affecting unique archeological and historically significant resources, including resources within the Topock Cultural Area. Mitigation Measure CUL-1a-3(c) requires PG&E to coordinate with BLM and San Bernardino County to facilitate an outreach effort to the staff at Moabi Regional Park, requesting that they communicate to visitors the parts of the project area that are off limits to off-road vehicle usage because of health and safety concerns, public lands management plans, or landowner requests. This includes offering to design, develop, and fund the installation of an informational kiosk within Park Moabi that informs visitors of the work being done at the project site. As part of this process, PG&E must make a good faith effort to involve the surrounding tribes in this outreach effort, providing Interested Tribes with the		The ACEC Management Plan will dictate appropriate signage and management of the area. The Tribes will have the opportunity to provide input on the ACEC Management Plan through other consultation efforts with the Federal agencies. BLM has taken measures to reduce potential for incursion by outside parties, e.g., recreational ORVs, and is scheduled to amend the Bullhead Travel Management Plan in FY 2016.	The Tribe looks forward to the timely completion of the ACEC management plan. It is the opinion of the Tribe that the delay in completing this management plan is inappropriate particularly in light of the potential impacts to both environmental and cultural resources that may occur as a result of the remedy infrastructure. It is very likely that delays in finalizing the ACEC management plan will contribute to an increased occurrence of what would have been avoidable impacts to the Topock landscape.	DTSC Response: Tribal comment noted.

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							opportunity to comment on outreach materials or provide a tribal cultural resources specialist the opportunity to participate in the outreach activities. PG&E also must involve the tribes to the maximum extent feasible, as determined by DTSC, in the design and development of the informational kiosk. These information kiosks do not change otherwise applicable trespass laws. In addition to the informational kiosks, Mitigation Measure CUL-1a-3(d) requires PG&E to post signage to indicate those parts of the project area that are off limits to off-road vehicle usage due to possible health and safety concerns and to reduce potential damage to environmental resources. If agreed to by land owners and/or local, state, or federal management entities within the project area, PG&E shall work with the relevant land owner or land management entity to develop, design, and fund the installation of easily visible and clear signage. This may include coordination with BLM to install signage noting the designation of the area as an Area of Critical Environmental Concern owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources. Additionally, beyond the requirements of EIR Mitigation Measure CUL-1a-3(c) and (d), as				

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							described in BLM's Tribal Access Plan for Federal Properties, public entry to a portion of the northern half of the APE in California is closed by order of BLM dated July 31, 2006. In its Tribal Access Plan, BLM states that it closed portions of roads on public lands within the Topock Remediation Project APE to motorized and mechanical vehicle use, to protect soils, vegetation and cultural resources that have been adversely impacted, or are at risk of being adversely impacted by off-highway vehicle use. BLM states that "[t]he placement of notices, signs, and rock barriers used to block existing roads will be determined after the Federal Government's consultation with regional tribes has been completed. Comments offered by the Tribes will be taken into consideration before any measures are employed to block and sign roads."				
330	Hualapai/TRC	Non-design	Request for Information	3.5.4 Page 3-64 Site Safety and Security	PG&E's efforts will include coordinating with BLM to install signs that note the designation of the areas as an ACEC owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.	What enforceable trespassing laws are created under the placements of these signs? Is there any evidence that the posting of non-enforceable signs decreases visitor pressures? Will the wording and placement of signs be coordinated with the Tribes in anyway?	See above			Hualapai look forward to the completion of the ACEC management plan. It is the opinion of the Hualapai that the delay in completing this management plan is inappropriate particularly in light of the potential impacts to both environmental and cultural resources that may occur as a result of the remedy infrastructure. Delays in finalizing the ACEC management plan will contribute to an increased occurrence of what would have been avoidable impacts to the Topock landscape.	DTSC Response: Tribal comment noted.
331	Cocopah/TRC	Non-design	Request for Information	3.5.4 Page 3-64 Site Safety and	PG&E's efforts will include coordinating	What enforceable trespassing laws are created under the placements of these signs? Is there any evidence that the posting of non-enforceable signs decreases visitor pressures? Will the wording and placement of signs be coordinated with the Tribes in anyway?	See above			The Tribes look forward to the completion of the ACEC management	DTSC Response: Tribal comment noted.

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				Security	with BLM to install signs that note the designation of the areas as an ACEC owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.					plan. It is the opinion of the Tribes that the delay in completing this management plan is inappropriate particularly in light of the potential impacts to both environmental and cultural resources that may occur as a result of the remedy infrastructure. It is very likely that delays in finalizing the ACEC management plan will contribute to an increased occurrence of what would have been avoidable impacts to the Topock landscape.	
332	Chemehuevi/ TRC	Non-design	Request for Information	3.5.4 Page 3-64 Site Safety and Security	PG&E's efforts will include coordinating with BLM to install signs that note the designation of the areas as an ACEC owing to its biological and cultural resources, while ensuring that signs are placed in a way that does not draw unwanted attention to specific resources.	What enforceable trespassing laws are created under the placements of these signs? Is there any evidence that the posting of non-enforceable signs decreases visitor pressures? Will the wording and placement of signs be coordinated with the Tribes in anyway?	See above			The Tribes look forward to the completion of the ACEC management plan. It is the opinion of the Tribes that the delay in completing this management plan is inappropriate particularly in light of the potential impacts to both environmental and cultural resources that may occur as a result of the remedy infrastructure. It is very likely that delays in finalizing the ACEC management plan will contribute to an increased occurrence of what would have been avoidable impacts to the Topock landscape.	DTSC Response: Tribal comment noted.
333	DTSC-81	Design	Monitoring	3.6 Monitoring Well Design/ Page 3-65	"The proposed monitoring program, monitoring well network (includes 35 new well locations), and data quality objectives are discussed in the Sampling and Monitoring Plan, Volume 2 of the O&M Manual."	DTSC requests clarification regarding the 35 new well location tally. Table 3.6-2 lists at least 38 new well locations. The actual number should be reported.	The cited text will be edited as follows: "The proposed monitoring program, monitoring well network (~~includes 35 new well locations)~~, and data quality objectives are discussed in the Sampling and Monitoring Plan, Volume 2 of the O&M Manual." Consistent with the response to comment 335 (DTSC-83), the total number of boreholes/ well locations planned for the remedy is	Resolved.			Comment resolved.

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							documented in Tables ES-2A and ES-2B, and redundant discussion of the number of boreholes/well locations will be removed from the text in Section 3.6.				
334	DTSC-82	Design	Monitoring	3.6 Monitoring Well Design/ Page 3-65	"Preliminary screen interval estimates for each of the proposed supplemental monitoring locations are provided in Table 3.6-1. However, the details included in this table are estimated and will likely change as additional data are collected during construction.	The preliminary screen interval estimates for each of the proposed monitoring locations were <u>not</u> provided in Table 3.6-1 of the September 2014 90% submittal. An updated Table 3.6-1 for all new monitoring wells was provided in the February 2015 supplemental submittal. See separate comment below regarding screen interval lengths. Some initial concerns with screen intervals for those intervals provided in Table 3.6-1 are identified below and should be addressed: MW-HH/II: Revise the document to have two screened intervals (from 20 to 40' long) at each well location to maximize coverage of the aquifer thickness (also to assess if TDS stratification affects injected water flow). MW-FF/GG: Table 3.6-1 indicates two intervals monitored, yet cross-section D-D' (Figure 3.1-5) illustrates four. Revision is required based on this discrepancy. Obviously, DTSC would prefer four zones to monitor the entire aquifer thickness as depicted in Figure 3.1-5, but recognizes that Tribes would want only one borehole and PG&E would probably propose two boreholes to monitor four zones in this area. Discussion is needed. A number of alternatives/options exist including: utilizing Westbay/Solinist-type wells to screen multiple zones while using one borehole; Utilizing packers to separate two screened intervals; Installing three monitoring zones in one borehole; and Alternating/offsetting dual screened zones in wells MW-GG/MW-FF. Of course, hydrogeological information obtained from nearby/associated wells MW-Q and IRL-4 could assist in the final well design. Aquifer testing at IRL-4 with MW-Q and possibly MW-J and MW-R as observation well clusters (all proposed to be screened with four intervals) is currently requested to assist in assessing more permeable zones in the area which may help guide the number of monitoring intervals in MW-GG/MW-FF. The exact same issues exist for the other Arsenic Monitoring wells (MW-AA to MW-EE) except as the aquifer should thicken to the north, the need for additional screened intervals is further supported towards the north.	See RTC #336 DTSC-84 regarding MW-HH and II. Regarding MW-FF and GG, the cross section that indicates four monitoring intervals pre-dates the finalization of Table 3.6-1 for the 90% design submittal. The cross-section will be revised to show two monitoring intervals in accordance with Table 3.6-1; however, it should be noted that Table 3.6-1 includes estimated design details based on hydrogeologic information collected to date. As indicated in footnote 1, the actual design details are subject to change based on observations in the field. Alternative monitoring well designs are evaluated in Section 3.6 of the design (see also the comment and response to comment 336 [DTSC-84]). Rationale for the collection and use of field data is provided in Section 3.2.1 of the C/RAWP. Also see the response to comment 346 (DTSC-86) regarding the number of screen intervals required at each location.	Resolved.			Comment resolved.
335	DTSC-83	Design	Monitoring	3.6.1 Key Variables and Well Design Considerations Borehole Quantity Constraints/ Page 3-66	"However, the number of available boreholes is limited (DTSC 2011d). No more than 60 boreholes can be installed for the construction of monitoring wells. To date,	This paragraph should be revised to be consistent with DTSC's position on well counts. DTSC has repeatedly clarified that although the total number of wells should be minimized to address tribal concerns, but should be sufficient for proper operation and monitoring of the remedy. The cited monitoring well count was based on an estimate generated by PG&E circa 2009 when the CMS was being developed and when the proposed remedy was highly conceptual. The estimated well count was also established prior to the East Ravine and compressor station evaluations which, at the time, were thought to be uncontaminated by PG&E. However, for clarity of the design, the total number of boreholes planned for the remedy should be documented. According to an August 2, 2014 email from CH2MHill, PG&E is planning to install 53 monitoring well locations and 4 provisional locations that totals to 73 monitoring well boreholes when including the existing 16 wells). Please verify the current count and clearly indicate in the design document.	The "Borehole Quantity Constraints" portion of Section 3.6.1 will be re-written to speak to the design requirement of minimizing the total number of boreholes drilled for construction of the remedy monitoring network and not include discussion of the specific quantity of wells/boreholes. The	Resolved.			Comment resolved.

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					16 of the allotted 60 boreholes have been installed as part of the investigation activities in the East Ravine area. As a result, 43 boreholes remain available for monitoring well construction associated with the final groundwater remedy.”		total number of boreholes planned for the remedy is documented in Tables ES-2A and ES-2B, and these tables supersede the information provided in the August 2, 2014 email referenced by DTSC in this comment. As stated in Tables ES-2A and ES-2B, the estimated borehole count is 100 for planned monitoring and remediation wells and 70 for future provisional monitoring and remediation wells, which when added to the existing 18 boreholes, totals 188 boreholes. A reference to these tables will be added to the revised text, as indicated below: “**Borehole Quantity Constraints:** Multiple monitoring depths will ~~likely~~ be needed at ~~each~~ the majority of new monitoring locations. Using conventional well design ~~most commonly used at Topock,~~ each monitoring interval would require a separate borehole. However, the number of ~~available~~ boreholes ~~is limited~~ drilled to construct the remedy well network will be minimized to address tribal concerns, yet must be sufficient for proper operation and monitoring of the remedy. ~~No more than 60 boreholes can be installed for the construction of monitoring wells. To date, 16 of the allotted 60 boreholes have been installed as part of the investigation activities in the East Ravine area. As a result, 43 boreholes remain available for monitoring well~~				

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							~~construction associated with the final groundwater remedy.~~ ~~If~~ Therefore, utilizing an alternate well design ~~were used~~ that could monitor multiple zones within a single borehole and meet groundwater monitoring objectives (thereby minimizing the total number of boreholes required)~~, the 19 proposed locations would require 19 total boreholes and 24 boreholes would remain available for future groundwater monitoring requirements. However, if multiple boreholes are required at some or all of the 19 locations, the flexibility to install wells later on to meet future monitoring requirements may be limited. Therefore, monitoring well designs that require fewer boreholes to meet the monitoring objectives are~~ is strongly preferred at the Topock site. Tables ES-2A and ES-2B (Executive Summary of this document) provide a detailed accounting of the planned and future provisional boreholes included in the design of the groundwater remedy for both monitoring wells and remediation wells."				
336	DTSC-84	Design	Monitoring	3.6.3 Well Design Selection/ Page 3-70	"The new monitoring wells are also designed to monitor remedial activities and will generally have longer screen lengths. The exception to this may be the wells designed to monitor the distribution of carbon along	New contaminant plume monitoring wells should be designed just like the hundreds of existing monitoring wells that were used to discretely characterize the plume. These existing monitoring wells are also proposed to be part of the monitoring network. Having two differing designs may lead to additional interpretation problems, diminish the value of the historical data base, and potentially lead to more wells in the future. As a general rule, contaminant plume monitoring wells should be constructed with screen lengths of 10 to 20 feet. Request screen interval changes to 20 feet in the following Table 3.6-1 wells: MW-O, U, V, X, Y, and slant wells. Additionally, two intervals should be monitored at well MW-V. Monitoring wells used to monitor gross changes in water quality (e.g., effects of groundwater injection) can use larger screen lengths similar to that already used at the OW and CW series wells (20 to 50 foot screen intervals). Revision of the section is required. Additionally, low flow purging is currently not proposed for longer screened wells (such as CW	PG&E agrees that plume monitoring wells should be designed for compatibility with the existing monitoring wells since they will be integrated as part of the remedy monitoring program. The screen lengths provided in Section 3.6 of the design were estimated to balance the anticipated data needs (based on estimated aquifer thickness) and the goal of minimizing the total	Resolved.			Comment resolved.

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					the IRZ line, where higher resolution may be desired for optimization of the groundwater remedy."	wells) at the Topock site and might negate its use at new, similar, long screen wells. Data interpretation can be complicated when using different sampling techniques (three volume vs low flow). Other than water quality issues, PG&E will also need to consider the appropriate number of short screened wells to provide discrete hydraulic information to assist with gradient and flow interpretations.	number of boreholes required to construct the new monitoring wells, with the understanding that the decision on final screen lengths will be made in the field based on the observed conditions at each borehole. The following text will be added to the end of the first paragraph in Section 3.6.3: "<u>As a general rule, contaminant plume monitoring wells should be constructed with screen lengths of 10 to 20 feet, and monitoring wells used to monitor gross changes in water quality (e.g., effects of groundwater injection) can use larger screen lengths similar to that already used at the OW and CW series wells (20 to 50 foot screen intervals).</u>" In addition, the estimated design details presented in Table 3.6-1 (and Table 3.2-5 of the C/RAWP) will modified in accordance with this comment, comment 334 (DTSC-82) and comment 346 (DTSC-86). Specifically: • The "Estimated Lengths of Interval(s) to Be Monitored" for plume monitoring wells including MW-, A, B, O, U, V, X, Y, and Z will be changed from "40" to "10-20" feet in length. • The "Estimated Lengths of Interval(s) to Be Monitored" for plume monitoring wells including MW-10D, 11D, C, D, E, F, G, H, K, L, M, N, R, and W will be changed from				

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							"20" to "10-20" feet in length. • The "Estimated Lengths of Interval(s) to Be Monitored" for monitoring wells use to monitor gross changes in water quality including MW-I, J, P, S, Q and AA through II will be changed from "50" to "20-50" feet in length. • The "Estimated Lengths of Interval(s) to Be Monitored" for the future provisional slant wells will be changed from "40" to "10-20" feet in length and the following footnote 3 will be added: "<u>Final number of slant well screens and the lengths will depend on well design and borehole angle.</u>" This footnote will also be referenced in the "Estimated Number of Intervals to be Monitored" field. • The "Estimated Lengths of Interval(s) to Be Monitored" for MW-T (listed as "TBD") and MW-70BR-D will not be changed. • The "Estimated Depths to be Monitored" presented in Table 3.6-1 will be adjusted to indicate a depth range representative of the maximum screened lengths listed in the "Estimated Lengths of Interval(s) to Be Monitored"				

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							(previous bullets). The exception to this will be for MW-HH and II, where the "Estimated Number of Intervals to be Monitored" will be increased to two (in response to comment 334 [DTSC-82]) and the estimated interval will be decreased to a depth range of 40 feet since the estimated saturated thickness is only 90-93 feet. • The following text will be added to the end of footnote 1: "<u>As requested by DTSC, at least three monitoring intervals (shallow-middle-deep) will be utilized to monitor portions of the aquifer that are 250 feet in thickness or greater.</u>" • In response to comment 346 (DTSC-86) the "Estimated Number of Intervals to be Monitored" for MW-AA, BB, and CC will be changed from "2" to "3". Per the fourth bullet in this response, the number of intervals for the slant wells will have a reference to new footnote 3. PG&E agrees that the use of multiple groundwater sampling techniques at monitoring wells across the same site is not ideal. At the time of the design, and in				

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							coordination with DTSC, PG&E is methodically integrating the low flow sampling technique as a replacement for the three volume purge technique, and intends to utilize only the low-flow technique provided the trial data is supportive. Regarding the consideration of the appropriate number of monitoring intervals to assist with hydraulic interpretations, the estimated screen lengths and vertical arrangement within the aquifer will be adequate to assess hydraulic conditions in the shallow, middle, and deep intervals, as is current practice at the site.				
337	FMIT/TRC	Non-design	Editorial	3.6.3 Page 3-70 Well Design Selection	In addition, these well types can generally be decommissioned in place, which is the preferred decommissioning method as it represents the field procedures that are least intrusive and create the least amount of disturbance.	This statement appears not to support the well decommissioning protocol which specifies that wells will be decommissioned on a well by well basis. Please ensure that the language included in the BOD report supports the commitment to address decommissioning on a well by well basis with Tribal stakeholder involvement	The referenced language is consistent with Well-SOP-1 in that decommissioning a well in place is the preferred decommissioning method because over-drilling is not necessary. That said, the 4th paragraph of Section 3.6.2 will be modified as follows: "Key design details associated with conventional, nested, and multi-level well types as they relate to the design constraints are provided below. <u>Well decommissioning considerations for each of the designs are also presented in this section; however, the actual decommissioning methods used will be determined for each well at the time of decommissioning.</u> Monitoring well designs are included in drawings C-16-01 through 03 of Appendix D, Plans			As the Tribe has stated many times throughout the design process Tribal preference is for all remedial infrastructure to be removed from the Sacred Landscape. This includes wells and well casings.	DTSC Response: Revised language provided for a well by well decision on decommissioning. However, in DTSC and DOI's joint direction letter to PG&E on 4/4/2014, the Agencies required PG&E to remove subsurface infrastructures to the extent possible. DTSC is also directing PG&E to consult with landowners for their ultimate preference. For well decommissioning, which is the original comment, PG&E will follow the Standard Operating Procedure in O&M manual Volume 1, Appendix B.

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							(Engineering Drawings)."				
338	Hualapai/TRC	Non-design	Editorial	3.6.3 Page 3-70 Well Design Selection	In addition, these well types can generally be decommissioned in place, which is the preferred decommissioning method as it represents the field procedures that are least intrusive and create the least amount of disturbance.	This statement appears not to support the well decommissioning protocol which specifies that wells will be decommissioned on a well by well basis. Please ensure that the language included in the BOD report supports the commitment to address decommissioning on a well by well basis with Tribal stakeholder involvement	See above			As Hualapai have stated many times preference is for all remedial infrastructure to be removed from the Sacred Landscape. This includes wells and well casings.	DTSC response: See RTC #337
339	Cocopah/TRC	Non-design	Editorial	3.6.3 Page 3-70 Well Design Selection	In addition, these well types can generally be decommissioned in place, which is the preferred decommissioning method as it represents the field procedures that are least intrusive and create the least amount of disturbance.	This statement appears not to support the well decommissioning protocol which specifies that wells will be decommissioned on a well by well basis. Please ensure that the language included in the BOD report supports the commitment to address decommissioning on a well by well basis with Tribal stakeholder involvement	See above			As the Tribes have stated many times throughout the design process, Tribal preference is for all remedial infrastructure to be removed from the Sacred Landscape. This includes wells and well casings.	DTSC response: See RTC #337
340	Chemehuevi/ TRC	Non-design	Editorial	3.6.3 Page 3-70 Well Design Selection	In addition, these well types can generally be decommissioned in place, which is the preferred decommissioning method as it represents the field procedures that are least intrusive and create the least amount of disturbance.	This statement appears not to support the well decommissioning protocol which specifies that wells will be decommissioned on a well by well basis. Please ensure that the language included in the BOD report supports the commitment to address decommissioning on a well by well basis with Tribal stakeholder involvement	See above			As the Tribes have stated many times throughout the design process, Tribal preference is for all remedial infrastructure to be removed from the Sacred Landscape. This includes wells and well casings.	DTSC response: See RTC #337
341	FMIT/TRC 1k	Non-design	Request for Information	3.6.3 Well Design Selection	In addition, angled wells might be required at select monitoring well locations in the	Please indicate which upland monitoring well locations are being considered for slant wells. What level of Tribal participation will occur in determining slant well locations?	Additional details/ specificities developed for select monitoring wells in the Upland subsequent to the submittal of the 90% design, supersede the		DOI concurs with PG&E's response.	Comment noted.	

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					upland (associated with the arsenic monitoring network).		reference text cited in the comment. The subsequent design document (Supplemental 90%) did not propose slant monitoring wells in the upland.				
342	Hualapai/TRC 1k	Non-design	Request for Information	3.6.3 Well Design Selection	In addition, angled wells might be required at select monitoring well locations in the upland (associated with the arsenic monitoring network).	Please indicate which upland monitoring well locations are being considered for slant wells. What level of Tribal participation will occur in determining slant well locations?	See above		See above	Comment noted.	
343	Cocopah/TRC 1k	Non-design	Request for Information	3.6.3 Well Design Selection	In addition, angled wells might be required at select monitoring well locations in the upland (associated with the arsenic monitoring network).	Please indicate which upland monitoring well locations are being considered for slant wells. What level of Tribal participation will occur in determining slant well locations?	See above		See above	Comment noted.	
344	Chemehuevi/ TRC 1k	Non-design	Request for Information	3.6.3 Well Design Selection	In addition, angled wells might be required at select monitoring well locations in the upland (associated with the arsenic monitoring network).	Please indicate which upland monitoring well locations are being considered for slant wells. What level of Tribal participation will occur in determining slant well locations?	See above		See above	Comment noted.	
345	DTSC-85	Design	Remedial design	Table 3.3-1	"Number of wells, total screen intervals, and screen depth placement at each well location ID are for purposes of pre-final (90%) design submittal and are continuing to be evaluated."	The cited text indicates that the total number of Freshwater Injection Wells is continuing to be evaluated. This does not seem appropriate for these two injection wells. Revision or clarification is requested. It is understood that more than one well may be placed at either FW-1 or FW-2 locations (see Section 3.3.3.3 page 3-45), but the "continuing to be evaluated" suggests on going work that is actively being considered behind the scenes. Suggest deleting "and are continuing to be evaluated." Otherwise, please explain and clarify what is being considered and when will decisions be made.	As suggested, the following text will be deleted from Table 3.3-1 "~~and are continuing to be evaluated~~" and replaced with "<u>and may be modified during installation</u>". The intent of this text was to indicate that the specifics of the well design may change during installation.	Resolved.			Comment resolved.

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346	DTSC-86	Design	Remedial design	Table 3.6-1	"Estimated Number of Intervals to be Monitored"	For saturated thicknesses of 250 feet or greater, it is requested that at least three monitoring intervals (shallow-middle-deep) be utilized to adequately monitor the thicker portions of the aquifer. See related DTSC comments above for page 3-65 of the design document.	Based on this DTSC direction, see response to comment 336 (DTSC-84) for changes to Table 3.6-1 (and Table 3.2-5 of the C/RAWP). Based on the changes in these tables, Tables ES-2A and 2B of the final design will be modified to indicate that 2 boreholes (and not one) will be required at monitoring well locations MW-AA, BB, and CC, and the following footnote will be added to the estimated number of boreholes for the future provisional slant wells: "The actual number of boreholes required for future provisional slant wells will depend on well design and borehole angle."	Resolved.			Comment resolved.
347	DTSC-94	Design	Monitoring	Footnote for Table 3.6-2	Basis for type of monitoring can be found in the O&M Manual Volume 2 Table 2.1-1 and 2.6-1	Possible typo. Table 2.1-1 is Data Quality Objectives Table. 2.1-2 is Monitoring Program Wells and Surface Water Sampling Points.	Correct, this is a typo. The footnote for Table 3.6-2 will be edited as follows: "Basis for type of monitoring can be found in the O&M Manual Volume 2 Table ~~2.1-1~~ 2.1-2 (Monitoring Program Wells and Surface Water Sampling Points) and 2.6-1 (Monitoring Program Wells and Surface Water Sampling Points for COPC Monitoring). These tables also provide a detailed accounting of monitoring objectives and associated analytes." See also response to comment 348 (DTSC-95).	Resolved.			Comment resolved.
348	DTSC-95	Design	Monitoring	Table 3.6-2	Plume Monitoring and COPC Monitoring	Table 2.1-2 of O&M Manual has expanded analytes and more detail than Table 3.6-2. What is the purpose of Table 3.6-2 which highlights limited wells and its corresponding analytes. Better to reference Table 2.1-2 for complete monitoring picture.	The header for the second column of Table 3.6-2 will be renamed as "Monitoring Objectives Summary" and will be assigned the footnote 1, as edited by the response to comment 347 (DTSC-94).	Resolved.			Comment resolved.
349	DTSC-87	Non-design	Monitoring	Figure 3.1-2	Figure 3.1-2	The chromium plume should be depicted as extending through well MW-46-175. Revision requested. MW-44 cluster should also be included on the section.	Well MW-46-175 was projected onto cross-	Resolved.			Comment resolved.

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					"…they are continuing to be evaluated through the design process and will be further modified during field installation."	The cited text suggests that well design details are still "continuing to be evaluated". Suggest revising the language as the design is nearly complete and, to DTSC's knowledge, no further pre-field assessments will occur. If additional work is currently underway or planned prior to field implementation, it should be clearly stated in the document. This comment applies to similar statements contained on other figures.	section A-A' for reference. Although the interpreted Cr(VI) plume does not extend as far north along the A-A' transect as MW-46-175, the plume can be expanded in this area as a conservative delineation. The MW-44 cluster will be projected onto cross-section A-A'. The "continuing to be evaluated" language will be replaced by "and may be modified during installation". The intent of this text was to indicate that the specifics of the well design may change during installation.				
350	DTSC-88	Non-design	Monitoring	Figure 3.1-5	Figure 3.1-5	Wells MW-13 and MW-37D should be removed from the figure as they are located too far from the cross-section line.	MW-13 and MW-37D will be removed from cross-section D-D'.	Resolved.			Comment resolved.
351	DTSC-89	Non-design	Monitoring	Figure 3.1-6	Figure 3.1-6	Well cluster MW-65 should be added to this section.	Well cluster MW-65 will be added to cross-section E-E'.	Resolved.			Comment resolved.
352	DTSC-90	Non-design	Monitoring	Figure 3.1-7	Figure 3.1-7	Well cluster MW-40 should be removed from the section as it is located too far from the cross-section line. MW-09 should be added due to its proximity.	Well cluster MW-40 was included as there were limited data points along this transect, but it will be removed to avoid misinterpretation. MW-09 will be added to cross-section F-F'.	Resolved.			Comment resolved.
353	DTSC-91	Design	Contingencies	Figure 3.3-1	Figure 3.3-1	Add Topock 2/3 and associated pipeline to pipeline schematic.	Addition will be made as requested.	Resolved.			Comment resolved.
354	DTSC-92	Design	Editorial	Figure 3.4-3	Figure 3.4-3	Delete "Conveyed by truck" from the legend as no planned route is currently presented. Otherwise revise the figure.	See revised Figure 3.4-3, included in **Attachment K** of the final RTC table.	Resolved.			Comment resolved.
355	DTSC-93	Design	Infrastructures	Figure 3.4-3	On-Site TU for flush water with pH <2.0 and as described in double asterisks.	Where is this "On-site Treatment Unit" located? Is it within the Remedy Produced Water Conditioning Plant, sounds like a TTU? Where are the specifications of this unit located in the design? Is it just pH adjustment as suggested by this figure?	The on-site treatment unit is a transportable treatment unit that would be located at or near the well that is being rehabilitated. As stated in Exhibit 3.4-3 of the 90% BOD, first flush water from well rehabilitation may be field neutralized and/or field filtered with a transportable treatment unit before disposal at TCS ponds, trucking offsite, or conveyed to the Remedy Produced Water Conditioning Plant.	Resolved.			Comment resolved.
Specific Comments – 90% BOD, Section 4: Integration of Sustainability Practices into Remedial Design and Implementation											

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356	FMIT/TRC	Design	Remedial Design	Section 4	Entire section	This section is incomplete therefore it is difficult to make any meaningful assessment of this section. Is there a timeline regarding when the various elements of this Sustainability assessment will be completed? What will be the review process for the future elements of this part of the design documents?	This section discusses the framework for and presents the results of the integration of sustainability principles and practices into the design. Ten sustainability factors were identified as applicable for the Topock remedy design and implementation as well as IM decommissioning; these factors are listed on page 4-2 of the 90% BOD. For each sustainability factor, several BMPs were identified and tabulated in the Green Remediation Evaluation Matrix (GREM) (see Table 4.0-1). The BMPs listed in the GREM were incorporated into each design stage (30%, 60%, 90%); the design documents were reviewed and comments on by agencies, Tribes, and stakeholders. The GREM will be scored when implemented during remedy construction, IM decommissioning, and when the system is in operation.				
357	Hualapai/TRC	Design	Remedial Design	Section 4	Entire section	This section is incomplete therefore it is difficult to make any meaningful assessment of this section. Is there a timeline regarding when the various elements of this Sustainability assessment will be completed? What will be the review process for the future elements of this part of the design documents?	See above				
358	Cocopah/TRC	Design	Remedial Design	Section 4	Entire section	This section is incomplete therefore it is difficult to make any meaningful assessment of this section. Is there a timeline regarding when the various elements of this Sustainability assessment will be completed? What will be the review process for the future elements of this part of the design documents?	See above				
359	Chemehuevi/ TRC	Design	Remedial Design	Section 4	Entire section	This section is incomplete therefore it is difficult to make any meaningful assessment of this section. Is there a timeline regarding when the various elements of this Sustainability assessment will be completed? What will be the review process for the future elements of this part of the design documents?	See above				
Specific Comments – 90% BOD, Section 5: Institutional Controls, Anticipated Approvals, Permits, and Agreements											
360	DTSC-96	Design	Process	Section 5 Institutional Controls, Anticipated Approvals, Permits, and Agreements		This section should establish a monitoring procedure to verify appropriate land use to ensure that contaminated groundwater is not being used or influenced by other parties. PG&E should notify agencies immediately if groundwater well installation unrelated to the remedy is noticed on private or federal lands in the vicinity of the plume or remedy infrastructure.	EIR Mitigation Measure Cul-1a-3b requires the preparation of a Site Security Plan outlining instructions for performing inspections of the project site and notifying land owners and DTSC of human-	Resolved.	The DOI 2010 Groundwater Record of Decision addresses institutional controls on page 36 stating that "The institutional controls adopted		Comment resolved.

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							caused disturbance to project facilities or significant cultural resources. *See* Sections 2.2 (Inspection) and 2.3 (Notification and Reporting) of the Site Security Plan, Appendix Q to the Construction/ Remedial Action Work Plan. In the course of performing its obligations under the Site Security Plan, if PG&E observes groundwater well installation unrelated to the remedy on private lands in the vicinity of the plume or remedy infrastructure, PG&E will notify DTSC and DOI. PG&E notes that there is limited private land ownership (PG&E, FMIT and BNSF property) within the footprint of the chromium plume and the areas outside the plume where control of groundwater flow directions and gradients is necessary to contain and remediate the chromium plume (see Figure 5.1-1 of the BOD). For the parcel owned by the FMIT, there is a Covenant and Environmental Restriction recorded, which prohibits the construction of water wells unrelated to the remedy until and unless DTSC and all other applicable governmental agencies approve such construction of wells. Additionally, PG&E and DTSC are discussing relevant institutional controls, including potential restrictions on water extraction unrelated to the remedy, at the Topock Compressor Station parcel. PG&E defers to DOI		by the Selected Remedy for the Site are specified in the BLM Lake Havasu Field Office Resource Management Plan issued in May 2007 and in the 1994 Lower Colorado River National Wildlife Refuges Comprehensive Management Plan. These plans restrict surface uses and use of the groundwater. Institutional controls will remain in place for the duration of the remedy until RAOs are achieved.”		

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							regarding groundwater well installation on federal lands.				
361	DTSC-97	Non-design	Legal	Section 5, page 5-1, 3rd Paragraph	"It is PG&E's understanding, after discussion with DTSC and DOI, that with respect to the majority of privately-owned lands, access agreements from existing landowners are appropriate IC mechanisms."	Although DTSC agrees that access agreements may provide some protection over the remedy (especially if infrastructure is located within the private parcel or access is needed for further site investigations). Access agreement alone, however, may not be sufficient to meet the objective of preventing interference or degradation of the hydraulic influence from the remedy. Access agreements also will not prevent the installation of new groundwater wells on private properties. PG&E should carefully consider the type of IC or agreement needed for the protection of the remedy at each privately held parcel that may have effect on the remedy and negotiate the appropriate agreements needed.	See RTC #361 DTSC-97. Additionally, the need for and effectiveness of institutional controls for the remedy will continue to be evaluated in the future, including during 5-year reviews to be conducted by DTSC and DOI.	Resolved.			Comment resolved.
362	FMIT/TRC	Design	Remedial Design	Sect. 5.1.1, p. 5-1	Arsenic monitoring wells	The Tribes are aware of the California State Water Board's position related to arsenic in groundwater near the freshwater injection wells. However, the Tribes had no input on the Water Board's decision to construct sentinel wells at proscribed radii to monitor arsenic. The Tribes reiterate their need for consultation in the careful placement of these wells to avoid areas of cultural sensitivity.		Since DTSC is the lead agency for the cleanup project, Tribal concerns regarding the sensitivity of the areas for monitoring wells have been discussed throughout the design process. Also, the Tribes always had the option of providing specific comments on the State Water Board's decision in writing. DTSC recalls that the Tribes were not in favor of pretreating the Arizona water due to footprint of treatment plant, therefore DTSC must balance the need to monitor the effects of the injected water with the desire to not have treatment system on site.		Officials from DTSC assured the Interested Tribes and stakeholders that a waiver would be granted for the slight exceedance of arsenic concentrations in injection water. However, meetings and hearings were held outside of the Topock process, and well sites were selected outside of the stakeholder process that had endeavored for many years for transparency and cooperation. The Water Board apparently was not interested in transparency and cooperation, and did not include input from those that would be injured the most—the Native American Tribes.	DTSC response: DTSC disagrees with the statement that we assured Tribes that a waiver would be granted for the arsenic exceedance as the State Board evaluated PG&E's proposal for arsenic injection in California. DTSC also disagrees with the generalization that the process excluded Tribal input. In particular selection and siting of monitoring wells. Agencies fully discussed each well location and conducted several site walks with Tribal representatives to gather input and preferences on its locations.
363	Hualapai/TRC	Design	Remedial Design	Sect. 5.1.1, p. 5-1	Arsenic monitoring wells	The Tribes are aware of the California State Water Board's position related to arsenic in groundwater near the freshwater injection wells. However, the Tribes had no input on the Water Board's decision to construct sentinel wells at proscribed radii to monitor arsenic. The Tribes reiterate their need for consultation in the careful placement of these wells to avoid areas of cultural sensitivity.		See above		Comment noted. Once the remedy is operational, the issue of pretreating the Arizona water may arise again due to data gaps, and or changes in water components. Hualapai consider this TRC#363 to be un-resolved.	DTSC response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
364	Cocopah/TRC	Design	Remedial Design	Sect. 5.1.1, p. 5-1	Arsenic monitoring wells	The Tribes are aware of the California State Water Board's position related to arsenic in groundwater near the freshwater injection wells. However, the Tribes had no input on the Water Board's decision to construct sentinel wells at proscribed radii to monitor arsenic. The Tribes reiterate their need for consultation in the careful placement of these wells to avoid areas of cultural sensitivity.		See above		Officials from DTCS assured the Interested Tribes and stakeholders that a waiver would be granted for the slight exceedance of arsenic concentrations in injection water. However, meetings and hearings were held outside of the Topock process, and well sites were selected outside of the stakeholder process that had endeavored for many years for transparency and cooperation. The Water Board apparently was not interested in transparency and cooperation, and did not include input from those that would be injured the most—the Native American Tribes.	DTSC response: See RTC #362
365	Chemehuevi/ TRC	Design	Remedial Design	Sect. 5.1.1, p. 5-1	Arsenic monitoring wells	The Tribes are aware of the California State Water Board's position related to arsenic in groundwater near the freshwater injection wells. However, the Tribes had no input on the Water Board's decision to construct sentinel wells at proscribed radii to monitor arsenic. The Tribes reiterate their need for consultation in the careful placement of these wells to avoid areas of cultural sensitivity.		See above		Officials from DTCS assured the Interested Tribes and stakeholders that a waiver would be granted for the slight exceedance of arsenic concentrations in injection water. However, meetings and hearings were held outside of the Topock process, and well sites were selected outside of the stakeholder process that had endeavored for many years for transparency and cooperation. The Water Board apparently was not interested in transparency and cooperation, and did not include input from those that would be injured the most—the Native American Tribes.	fully discussed each well location
366	DTSC-98	Design	Editorial	5.1 Define Areas for Future Restrictions/ Page 5-2	"…but the recirculation water flowlines will not pass through the area outside of the IC boundary as	As currently modeled, some recirculation water will pass through the area outside the IC boundary shown on Figure 5.1-1 (see flow lines in appendix B). Revision of text is required.	The last sentence of the first bullet under Section 5.1 (Define Areas for Future Restrictions) will be revised as follows in response to this comment (modifications are shown in strikeout				Comment resolved based on proposed language changes.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					shown on Figure 5.1-1, based on the current remedy configuration."		[~~strikeout~~; for text deletion] and underline [underline; for text addition]: The closest potential domestic well location would eventually intercept the simulated freshwater injection flow lines, ~~regardless of the domestic well pumping rate, but the recirculation water flowlines will not pass through the area outside of the IC boundary as shown on Figure 5.1-1, based on the current remedy configuration.~~ and possibly a small portion of recirculation water simulated flow lines, but the concentration of potential byproducts would be at background levels at this distance, based on transport modeling results presented in Section 7 of Appendix B.				
367	DTSC-99	Design	Other	5.1 Define Areas for Future Restrictions/ Page 5-2	"Information obtained from the Topock Marina on Historic Route 66 during the first quarter 2013 indicates that they are planning to conduct exploratory drilling on their property in hope of locating a groundwater supply well that can produce about 2,000 gallons per minute for use as fire protection water at their facility. At the time of the 90% design, a 16-inch well has been	The bullet should be updated to add what is now known about the recently installed Marina well (Is it still in use? - Any plans for more wells? - What are the historic and planned extraction volumes? - etc.).	Information obtained from the Topock Marina on Historic Route 66 in April 2015 indicates that the Marina well is still in use for fire protection water at their facility. The well is capable of producing 1,700 gallons per minute. There is no plan to drill more wells at this time, however, the Marina still maintains this as an option. Text will be updated to reflect this information.	Resolved.			Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					installed to supply fire protection water; this well is currently in use.”						
368	DTSC-100	Design	Other	5.1 Define Areas for Future Restrictions/ Page 5-2	“Additional simulations will be conducted to verify the Category 1 ICs area if the remediation well configuration changes and as new hydraulic data collected prior to the remedy implementation are incorporated into the groundwater flow model.”	This comment supports the need for a reliable groundwater model both during design and after the remedy is implemented. See DTSC general comment of the groundwater model above.	Comment noted.				
369	DTSC-101	Design	Monitoring	Section 5.1, page 5-3, end of first paragraph	“Simulated pumping at HNWR-1A at the nominal design flowrate also suggests that pumping at HNWR-1A also will not substantially adversely affect the production rates of existing nearby wells.”	Please note that DTSC is not only concerned with the production rates of existing private wells, but also the quality of the water that is available for the well owners. PG&E should monitor the water quality surrounding freshwater well location to periodically assess if any there are any adverse quality and quantity impacts to existing wells around the area.	Comment noted. PG&E will implement a domestic/private water well monitoring program to evaluate potential effects the remedy could impart to private wells both chemically and hydraulically (see O&M Manual Volume 2, Section 5.4, and 60% RTC #709 DTSC-222).	Resolved.			Comment resolved.
370	DTSC-102	Non-design	Legal	Section 5.3.3, page 5-4, last sentence.	“PG&E plans to coordinate with the RWQCB regarding substantive requirements applicable to the use of the evaporation ponds at PG&E Topock Compressor Station for disposal of certain remedy produced water streams…”	Please note that the RWQCB has existing WDRs for the subject ponds. All material changes to the ponds including improvements and waste discharge will require a modification of the existing WDRs as agreed upon between DTSC, RWQCB, DOI and PG&E. Furthermore, substantive changes may also require CEQA considerations.	Comment noted. PG&E is coordinating with the RWQCB on the substantive requirements for use of the ponds for disposal of remedy-produced water streams. PG&E is currently developing a Report of Waste Discharge for purposes of amending the existing WDRs. PG&E understands further CEQA evaluation would be required if there are new or substantially more severe impacts than those already disclosed in prior	Resolved.			Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							environmental review, but does not anticipate such impacts.				
Specific Comments – 90% BOD, Section 6: Compliance with ARARs and EIR Mitigation Measure Monitoring Program											
371	DTSC-103	Non-design	Editorial	Section 6.1, last sentence of 2nd paragraph	"… these reports are available on the project SharePoint site."	SharePoint site is a working repository of documents for reviewing parties. When the design is finalized and approved. This design becomes record as with any document referenced. If PG&E is not expecting to maintain the SharePoint Site in perpetuity, it is recommended that this statement and the hyperlink be removed.	The hyperlink to the SharePoint site was included in the 90% document for ease of retrieval/access to the cited reports by reviewing parties. The cited text will be removed in the Final Design.	Resolved.			Comment resolved.
372	DTSC-104	Non-design	Request for Information	Section 6.1, 3rd paragraph	CIMP	Please reference the location of the CIMP in the design document (i.e. C/RAWP Appendix H).	The following text will be added before the last sentence of the 3rd paragraph of Section 6.1: "The CIMP (with IM-3 Decommissioning Plan) is included in Appendix H of the C/RAWP".	Resolved.			Comment resolved.
373	FMIT/TRC RTC, 60% #260 & #263	Non-design	Monitoring	6.1/6-1		Tribal response was "*The Tribes would request that as sound monitoring details are resolved, the usage of the Topock area as a location of deep spiritual meaning and associated usage would be taken into account to the fullest extent possible.*" This will be an ongoing process and it will be important to continue this dialogue during the construction and operation phases.	Comment noted. See RTC #23 FMIT-9 (addressing noise protocols) and RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/ TRC, and #47 Chemehuevi/TRC (addressing communications generally).		Comment noted.	Comment noted. However, this will be an ongoing dialogue and therefore this comment is considered unresolved.	
374	Hualapai/TRC RTC, 60% #260 & #263	Non-design	Monitoring	6.1/6-1		Tribal response was "*The Tribes would request that as sound monitoring details are resolved, the usage of the Topock area as a location of deep spiritual meaning and associated usage would be taken into account to the fullest extent possible.*" This will be an ongoing process and it will be important to continue this dialogue during the construction and operation phases.	See above		See above	Comment noted. However, this will be an ongoing dialogue and therefore this comment is considered unresolved.	
375	Cocopah/TRC RTC, 60% #260 & #263	Non-design	Monitoring	6.1/6-1		Tribal response was "*The Tribes would request that as sound monitoring details are resolved, the usage of the Topock area as a location of deep spiritual meaning and associated usage would be taken into account to the fullest extent possible.*" This will be an ongoing process and it will be important to continue this dialogue during the construction and operation phases.	See above		See above	Comment noted. However, this will be an ongoing dialogue and therefore this comment is considered unresolved.	
376	Chemehuevi/ TRC RTC, 60% #260 & #263	Non-design	Monitoring	6.1/6-1		Tribal response was "*The Tribes would request that as sound monitoring details are resolved, the usage of the Topock area as a location of deep spiritual meaning and associated usage would be taken into account to the fullest extent possible.*" This will be an ongoing process and it will be important to continue this dialogue during the construction and operation phases.	See above		See above	Comment noted. However, this will be an ongoing dialogue and therefore this comment is considered unresolved.	
377	FMIT/TRC RTC, 60% #261	Non-design	Monitoring	6.1-6-1		Tribal response was "*Tribal concerns regarding noise may be different than applied regulatory standards. The Tribes would like to continue a dialogue with the agencies to further clarify the nature of noise and vibration impacts.*" This will be an ongoing process and it will be important to continue this dialogue during the construction and operation phases.	PG&E defers to the Agencies for response to the Tribes' request to continue a dialogue with the Agencies.	As stated in response to RTC #44, DTSC intent to continue meetings with stakeholders and Tribes throughout the project. If Tribes	Although it is anticipated that ongoing communication will occur during construction & operation, DOI would like to gain	Comment noted. However, this will be an ongoing dialogue and therefore this comment is considered unresolved.	

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
								have specific concerns regarding noise and vibration impacts, DTSC encourages the Tribes to provide input for consideration as part of the CEQA EIR process.	an understanding of the expected outcome of the dialogue.		
378	Hualapai/TRC RTC, 60% #261	Non-design	Monitoring	6.1-6-1		Tribal response was "*Tribal concerns regarding noise may be different than applied regulatory standards. The Tribes would like to continue a dialogue with the agencies to further clarify the nature of noise and vibration impacts*." This will be an ongoing process and it will be important to continue this dialogue during the construction and operation phases.	See above	See above	See above	Comment noted. However, this will be an ongoing dialogue and therefore this comment is considered unresolved.	
379	Cocopah/TRC RTC, 60% #261	Non-design	Monitoring	6.1-6-1		Tribal response was "*Tribal concerns regarding noise may be different than applied regulatory standards. The Tribes would like to continue a dialogue with the agencies to further clarify the nature of noise and vibration impacts*." This will be an ongoing process and it will be important to continue this dialogue during the construction and operation phases.	See above	See above	See above	Comment noted. However, this will be an ongoing dialogue and therefore this comment is considered unresolved.	
380	Chemehuevi/ TRC RTC, 60% #261	Non-design	Monitoring	6.1-6-1		Tribal response was "*Tribal concerns regarding noise may be different than applied regulatory standards. The Tribes would like to continue a dialogue with the agencies to further clarify the nature of noise and vibration impacts*." This will be an ongoing process and it will be important to continue this dialogue during the construction and operation phases.	See above	See above	See above	Comment noted. However, this will be an ongoing dialogue and therefore this comment is considered unresolved.	
381	DOI-5	Non-design	Other	6.2/6-2		A brief description and discussion of the Appropriate Use Analysis and Compatibility Determination (Table 6.2-1A) should be provided.	The following text will be added to Section 6.2: "<u>The National Wildlife Refuge System Administration Act as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 USC §§ 668dd-ee, 50 CFR Part 27) was identified by DOI as a Location-Specific ARAR that is Applicable to the project (Item #7 in Table 2 of the ROD). The ROD states that "This Act governs the use and management of National Wildlife Refuges. The Act requires that FWS evaluate ongoing and proposed activities and uses to ensure that such activities are appropriate and compatible with both the mission of the overall National Wildlife Refuge System, as well as the specific purposes for which the Havasu National Wildlife Refuge</u>		DOI agrees with the additional text.		DOI and USFW will continue to work with PG&E regarding the AUA /CD for the HNWR and associated mitigation.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							was established . . . ." and that "[a]s the Selected Remedy is designed and implemented, DOI will continue to consult with USFWS to ensure that proposed activities remain appropriate and compatible with the Refuge mission." As requested by DOI during the 60% RTC process, information to facilitate the HNWR's Appropriate Use Analysis and Compatibility Determination is memorialized in Table 6.2-1A. Specific information included in Table 6.2-1A includes the proposed actions/facilities, where, when, and how the use would be conducted, what the anticipated impacts will be, planned mitigation for the loss of functional value of refuge while use is in operation, how and when the actions/facilities will be closed out, and any contingency plans that will be in place."				
382	FMIT/TRC	Non-design	Request for Information	TABLE 6.1-1 Summary of Compliance with EIR Mitigation Measures Biological Resources Bio 3a	No further action is required. The pre-final (90%) design does not include a river water intake structure.	Please indicate if future provisional freshwater sources could include a river water intake or has this been removed from consideration throughout the remedy entirely?	A river water intake is no longer considered as a potential source of freshwater for the remedy.		DOI concurs with PG&E's response.	Noted.	
383	Hualapai/TRC	Non-design	Request for Information	TABLE 6.1-1 Summary of Compliance with EIR Mitigation Measures Biological Resources Bio 3a	No further action is required. The pre-final (90%) design does not include a river water intake structure.	Please indicate if future provisional freshwater sources could include a river water intake or has this been removed from consideration throughout the remedy entirely?	See above		See above	Noted.	
384	Cocopah/TRC	Non-design	Request for Information	TABLE 6.1-1 Summary of Compliance	No further action is required. The pre-final (90%)	Please indicate if future provisional freshwater sources could include a river water intake or has this been removed from consideration throughout the remedy entirely?	See above		See above	Noted.	

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
				with EIR Mitigation Measures Biological Resources Bio 3a	design does not include a river water intake structure.						
385	Chemehuevi/ TRC	Non-design	Request for Information	TABLE 6.1-1 Summary of Compliance with EIR Mitigation Measures Biological Resources Bio 3a	No further action is required. The pre-final (90%) design does not include a river water intake structure.	Please indicate if future provisional freshwater sources could include a river water intake or has this been removed from consideration throughout the remedy entirely?	See above		See above	Noted.	
386	DTSC-105	Design	Editorial	Table 6.2-1, Item 1, Page 6-67	"Although concentrations of Cr(VI) and in-situ byproducts (e.g., arsenic, manganese) may fluctuate within the treatment area during remedy implementation, institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete."	Request revision of the cited sentence as follows to address fresh water arsenic injection and overall monitoring approach, "Although concentrations of Cr(VI), freshwater arsenic, and in-situ byproducts (e.g., arsenic, manganese) will increase or may fluctuate ~~within the treatment area~~ during remedy implementation, institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete and elevated concentrations have reverted back to values below MCLGs, MCLs, RAOs, or background concentrations." Similar edits should be made to Item No. 99 in Table 6.2-1.	PG&E suggests potential edits (in green) to DTSC's edits: "Although concentrations of Cr(VI), ~~freshwater~~ arsenic from freshwater injection, and in-situ byproducts (e.g., arsenic, manganese) should ~~will~~ increase or fluctuate within or immediately adjacent to the plume. ~~within the treatment area~~ During remedy implementation, institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. At the completion of the remedy, any elevated concentrations resulting from PG&E's activities should have reverted back to values below MCLGs that are set at levels above zero, MCLs, RAOs, or background concentrations."	Resolved.			Comment resolved.
387	DTSC-106	Design	Editorial	Table 6.2-1, Item 2, Page 6-68	"Modeling indicates that arsenic concentrations that may temporarily be elevated by the generation from in-situ remediation and freshwater injection are	Edit cited sentence as follows, "Modeling indicates that elevated arsenic concentrations ~~that may temporarily be elevated by the~~ generated from in-situ remediation and freshwater injection are localized, will attenuate under site conditions and will return to preremedy baseline levels several years after the end of active remediation and the cessation of freshwater injection, respectively." Similar edits should be made to ARARs No. 99 100, and 101 in Table 6.2-1. Also, See requested insert language from Table 6.2-1, Item 1 above to extend sentence ending with … "until the remedy is complete."	PG&E proposes potential edits (in green) to DTSC's edits: "Modeling indicates that elevated arsenic concentrations ~~that may temporarily be elevated by the~~ generated from in-situ remediation and freshwater injection are localized, will attenuate	Resolved.			Comment resolved.

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					localized, will attenuate under site conditions and will return to preremedy baseline levels after the end of active remediation and the cessation of freshwater injection, respectively."		under site conditions and will return to preremedy baseline levels ~~several~~ approximately 10 years after the end of active remediation and the cessation of freshwater injection, respectively." Similar edits will be made to ARARs No. 99, 100, and 101.				
388	DOI-6	Non-design	Editorial	Table 6.2-1, Item 40, 90% design compliance status	The Final Groundwater Remedy PBA was prepared to support informal consultations for actions to be conducted under the remedial action, including activities located on BLM and U.S. Fish and Wildlife Service administered lands. Coordination with USFWS, BLM, and DOI on the PBA had occurred. This ESA Section 7 consultation was concluded with receipt of USFWS concurrency letter on July 7, 2014 which preceded the approval of the Construction/Remedial Action Work Plan.	Please modify text to the following: The Final Groundwater Remedy PBA was prepared to support informal consultation for actions to be conducted under the remedial action, including activities located on BLM and U.S. Fish and Wildlife Service administered lands. Coordination with USFWS, BLM, and DOI on the PBA occurred. This ESA Section 7 consultation was concluded with receipt of USFWS concurrence letter on July 7, 2014 which preceded the approval of the Construction/Remedial Action Work Plan.	Text will be modified as requested.		Accepted.		Comment resolved pending DOI review of the final design documents.
389	DOI-7	Non-design	Editorial	Table 6.2-1, Item 41, 90% design compliance status	PG&E submitted the Final Bird Impact Avoidance and Minimization Plan (CH2M Hill, 2014d) on April 30, 2014.	Please modify the text as follows: Regarding decommissioning activities, another Avoidance and Minimization Plan will be based on surveys conducted prior to decommissioning, and during the breeding season; therefore this Plan will be prepared in the future, prior to decommissioning.	Text will be modified as requested.		Accepted.		Comment resolved pending DOI review of the final design documents.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					The plan is also included as an appendix of the Construction/Remedial Action Work Plan, and Appendix I of the IM-3 Decommissioning Work Plan. Regarding decommissioning activities, the Avoidance and Minimization Plan will be based on surveys conducted prior to decommissioning, and during the breeding season; therefore this Plan will be prepared in the future, prior to decommissioning.						
390	DTSC-107	Design	Editorial	Table 6.2-1, Item 52, Page 6-69	"The State MCL for Cr(VI) is 10 µg/L. The RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation."	Edit cited sentence as follows, "The State MCL for Cr(VI) is 10 µg/L, but the RAO has been established based on the regional alluvial aquifer background concentration of 32 µg/L at the conclusion of remedy implementation." Similar edits should be made to ARARs No. 99 in Table 6.2-1. Also, See requested insert language from Table 6.2-1, Item 2 above.	PG&E proposes potential edits (in green) to DTSC's edits: "The State MCL for Cr(VI) is 10 µg/L, but the RAO has been established based on the regional Alluvial Aquifer background concentration of 32 µg/L at the conclusion of remedy implementation." Similar edits will be made to ARARs No. 99 in Table 6.2-1.	Resolved.			Comment resolved.
391	DTSC-108	Design	Editorial	Table 6.2-1, Item 55, Page 6-70	"Groundwater and vadose zone protection standards – Title 22, CCR, Div 4.5, Ch 15, Article 6, §66265.94"	Article 6 regulations (for both ISD and permitted facilities) are only applicable to specific regulated units, such as particular hazardous waste land farms, waste piles, surface impoundments, and landfills. These specific regulations do not apply to the RCRA corrective action that is being conducted at the site. Suggest acknowledging that it does not apply.	Item #55 was identified by DOI as a California Chemical-Specific ARAR that is Applicable to the project (Table 2 of the ROD). PG&E defers to DOI for response to this comment.	Resolved.	These specific regulations do not currently apply to the RCRA corrective action that is being conducted at the site. Table 6.2-1 should be modified to reflect this.		Comment resolved.
392	DTSC-109	Design	Editorial	Table 6.2-1, Item 46, Page	"Construction of wells in	It is believed the cited sentence should be revised to read, "Construction of ~~wells~~ treatment plant in Arizona"	Revision will be made as requested.	Resolved.			Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
				6-77	Arizona"						
393	DTSC-110	Design	Editorial	Table 6.2-1, Item 81, Page 6-84	"Corrective Action - Title 22, CCR, Div 4.5, Ch 14, Article 6, §66264.100 (a) through (d), (f), (g)(1), and (h)"	Article 6 regulations (for both ISD and permitted facilities) are only applicable to specific regulated units, such as particular hazardous waste land farms, waste piles, surface impoundments, and landfills. These specific regulations do not apply to the RCRA corrective action that is being conducted at the site. Suggest acknowledging that it does not apply. Same can be said for Items No. 91, 92, 93, and 94.	Items #81, 91, 92, 93, and 94 were identified by DOI as California Action-Specific ARARs that are Relevant and Appropriate to the project (Table 2 of the ROD). PG&E defers to DOI for response to this comment.	Resolved.	These specific regulations do not currently apply to the RCRA corrective action that is being conducted at the site. Table 6.2-1 should be modified to reflect this.		Comment resolved.
394	DTSC-111	Design	Editorial	Table 6.2-1, Item 83, Page 6-85	"Closure and postclosure care –Title 22, CCR, Div 4.5, Ch 14, Article 7, §66264.111, §66264.112, §66264.115 through 120"	The closure and post-closure regulations (Title 22, Article 7) regulations are only applicable to specific hazardous waste management facilities. These specific regulations do not apply to the RCRA corrective action that is being conducted at the site. Suggest acknowledging that it does not apply.	Item #83 was identified by DOI as a California Action-Specific ARAR that is Applicable to the project (Table 6.2-1 of the 90% BOD). PG&E defers to DOI for response to this comment.	Resolved.	These specific regulations do not currently apply to the RCRA corrective action that is being conducted at the site. Table 6.2-1 should be modified to reflect this.		Comment resolved.
395	DTSC-112	Design	Editorial	Table 6.2-1, Item 86, Page 6-88	"It is not anticipated that long-term storage of soil requiring construction of a waste pile meeting Chapter 14, Article 12 requirements for soil exhibiting RCRA hazardous waste characteristics will occur."	Revise the cited sentence as follows:, "~~It is not anticipated that l~~Long-term storage of soil requiring construction of a waste pile meeting Chapter 14, Article 12 requirements for soil exhibiting RCRA hazardous waste characteristics will not occur." If a RCRA Waste Pile were to be established, it would invoke a number of permitting regulations, including installing new wells to establish a new groundwater monitoring program specific to the regulated unit (i.e., waste pile).	Revision will be made as requested.	Resolved.			Comment resolved.
396	DTSC-113	Design	Editorial	Table 6.2-1A, Page 6-109	"An updated project schedule will be included in the 90% design and the future Remedial Action Work Plan.."	The cited sentence should be deleted.	The cited sentence will be deleted.	Resolved.			Comment resolved.
397	DOI-8	Non-design	Other	Table 6.2-1a, 6-109	The Construction/ Remedial Action Work plan includes a Habitat Restoration Plan in compliance with the CD Appendix C (Scope of Work), Article	While the Habitat Restoration Plan addresses new impacts to federal property (both BLM managed and HNWR) in California, the plan does not address the ongoing impacts from remedy implementation to the HNWR in Arizona. Previous discussions with PG&E indicated a willingness to consider further restoration on the Refuge to mitigate for the ongoing use of the wells in Arizona yet no proposal is provided in the plan. DOI requests that PG&E meet with the federal agencies to reach agreement on these measures and that the resolution be included in the RTCs and revised plans as well as noted in the specified table. A habitat restoration plan exists for the Sacramento Wash area of the HNWR that could be used to assist PG&E and DOI/USFWS in determining appropriate mitigation measures.	PG&E will coordinate with DOI and USFWS regarding mitigation measures to address impacts from remedy implementation to the HNWR in Arizona and will include any agreed upon measures in the Habitat Restoration Plan.		Resolved.		DOI and USFW will continue to work with PG&E regarding the AUA /CD for the HNWR and associated mitigation.

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					3. This plan has been prepared…						
Specific Comments – 90% BOD Section 7: Project Delivery Strategy/Updated Schedule											
398	MWD	Non-design	Editorial	Sect. 7.4/ 7-9	Criteria for Approval of IM-3 Decommissioning	Metropolitan's Comment No. 10 on the 60% Design questioned the need to state that DTSC may decide that decommissioning of IM-3 facilities could occur prior to OPS. In response, DTSC explained that it may consider timing of the decommissioning activities in advance of OPS determination when the remedy demonstrates reasonable success but with clear evidence of protection of the Colorado River. However, DTSC will provide notice to all stakeholders of the intent to decommission the IM-3 plant prior to approval to implement the IM-3 decommissioning plan . . . ." This language is missing from Section 7.4 and should be added as shown to the following text on page 7-9: "b) DTSC determines that the groundwater remedy is 'operating properly and successfully' (OPS) (unless DTSC determines, at its lawful discretion, that such decommissioning can occur prior to DTSC's OPS determination, in which case DTSC will provide notice to all stakeholders of the intent to decommission the IM-3 plant prior to approval to implement the IM-3 decommissioning plan)."	Item b in Section 7.4 text will be revised as requested (modifications are shown in underline [underline; for text addition]) : b) DTSC determines that the groundwater remedy is 'operating properly and successfully' (OPS) (unless DTSC determines, at its lawful discretion, that such decommissioning can occur prior to DTSC's OPS determination, in which case DTSC will provide notice to all stakeholders of the intent to decommission the IM-3 plant prior to approval to implement the IM-3 decommissioning plan).				Comment resolved.
Specific Comments – 90% BOD Section 8 and Appendix H: Updated Cost Estimate (Comments on this Appendix are combined with those on the Construction/Remedial Action Work Plan Appendix E as they are the same cost estimate)											
399	DOI-225	Non-design	Cost estimates	Purpose of Estimate/1		This paragraph should reference the financial assurance/performance guarantee cited in the Consent Decree.	The following modification will be made (modifications are shown in underline [underline; for text addition]): **Purpose of Estimate** PIVOX Corporation has prepared this construction cost estimate for the 90% (Pre-Final) Design of the PG&E Topock Compressor Station (the Site) final groundwater remedy (the Remedy). The estimate is intended to represent the budgetary cost of the Remedy at the 90% Design stage, to support PG&E's financial assurance certification for the Project as required by California Code of Regulations Title 22, Sections 66264 and 22.66265, and to		Accepted.		Comment resolved.

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							address the requirements of Section XIII, Performance Guarantee, of the Remedial Design/Remedial Action Consent Decree, Civil No. 5:13-cv-00074-BRO-OP.				
400	DOI-226	Non-design	Cost estimates	MMRPs/Oversight, and Institutional Controls/12		The text should reference the PA, CHPMP and PBA as well.	The following modification will be made (modifications are shown in underline [underline; for text addition]): **MMRPs, Oversight and Institutional Controls** Implementation of specific biological, cultural, and environmental controls during construction of the remedy is required by the Project EIR, the MMRP, the PA (BLM 2010), the CHPMP (BLM 2012), and the PBA (CH2M HILL 2014). Costs associated with implementation of MMRP were estimated by the design team during development of MMRP activities. The 90% Design estimate primarily compiled these costs as directed by the design team. The estimate for this task includes costs associated with the formation and continued operation of the Technical Review Committee. **References**: Bureau of Land Management. 2010. Programmatic Agreement Among the Bureau of Land Management, Arizona State Historic Preservation Officer, California State Historic Preservation Officer, and the Advisory Council on Historic Preservation for the Topock Remediation Project in San		Accepted.		Comment resolved.

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							Bernardino County, California, and Mohave County, Arizona. October. ______. 2012. Cultural and Historic Properties Management Plan, PG&E Topock Compressor Station, Needles, California. January 20. CH2M HILL. 2014. Programmatic Biological Assessment, Pacific Gas and Electric Company, Topock Compressor Station, Final Groundwater Remedy. April, 28.				
401	DOI-227	Non-design	Cost estimates	Attachment D		The estimate for regulatory oversight during construction appears inadequate. Please provide further detail regarding the estimate assumptions to the agencies to account for this cost.	Based on an analysis of recent regulatory oversight (DTSC and DOI) costs for the Topock remediation program, PG&E estimates that DTSC and DOI oversight will cost approximately $2.4M annually ($1.5M for DTSC, and $0.9M for DOI) for the overall Topock program during the years where GW remedy construction is occurring. This total includes all regulatory oversight, not just oversight associated with the groundwater remedy. PG&E estimates that during GW remedy construction, approximately one third of this total regulatory oversight spend will be associated with specific DTSC and DOI oversight of the GW remedy construction project, or $0.5M for DTSC and $0.3M for DOI, (total $0.8M annually). PG&E will revise this line item of the remedy cost estimate with the updated values. The revised estimate will be based on $800K annual		DOI concurs with the response.		Comment resolved.

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							spent over four years. Spend period assumes a 3 year construction period (as described in C/RAWP), plus 6 months before and after construction to account for oversight activities before mobilization and after completion of construction field activities. This will add approximately $2.9M in costs to the 90%/Supplemental design costs.				
402	DTSC-114	Non-design	Cost estimates	General	Contingency %	The contingency was reduced from the 15% used in the 60% design to 5% in the 90% design. The contingency should be returned to 15%. DTSC guidance is to use a contingency of 10-20%. There is enough uncertainty and the level of effort required for this site justifies the upper portion of this range. We also note the CE does not include costs for provisional wells or contingent actions (FWPTS).	The cost estimate will be revised with an across-the-board contingency factor of 15%. This will add approximately $14.9M in contingency costs to the 90%/Supplemental design costs. The text of Appendix H, Estimate Contingencies and Markups, will also be revised to address this comment.	Resolved.			Comment resolved.
403	DTSC-115	Non-design	Cost estimates	Task 1.3	# of wells	The number of wells included in the back-up documentation provided does not match the number of wells included in the 90% BOD, several IRZ injection wells appear to be missing. Also, the cost estimate should include installation of all contingent wells as that would constitute the worst case scenario, which is required for determining financial assurance.	All new wells are accounted for in the cost estimate. The difference in well counts between Drawing Sheet C-00-03 and the cost estimate is due to the counting method used for Dual-Screen Injection Well Clusters at the IRZ. These are counted as 2 wells on the drawing sheet, but were counted them as single well in the cost estimate. Contingent wells (referred to as future provisional wells in the design) were not included in the original cost estimate. The cost estimate has been revised to include this cost. If counted as a single unit (following the counting method for new intermediate wells	Resolved.			Comment resolved.

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							previously used in the cost estimate), there would be 22 future provisional injection wells and 5 future provisional extraction wells. The total additional cost for these 27 future provisional wells is approximately $18.8M prior to markup/ overhead/profit. The text of Appendix H, Section 1.3 will also be revised to address this comment.				
404	DTSC-116	Non-design	Cost estimates	General	Regulatory oversight	Cost for regulatory oversight included in the MMRP of $300,000 appears inadequate for DTSC oversight over the construction phase of the project. We note oversight costs for O&M activities are included separately.	See RTC #401 DOI-227. This will add approximately $2.9M in costs to the 90%/ Supplemental design costs.				
405	DTSC-117	Non-design	Cost estimates	Discount rate	Discount factor of 3.17% used	This is not consistent with DTSC's method of calculating Present Value using the Real Interest Rate listed in the Office of Management and Budgets (OMB) Circular A-94, Appendix C, currently listed as 1.4%, for all present worth calculations.	Section 8, Exhibit 8.1 will be revised using an interest rate of 1.4% for the 90%/Supplemental design cost estimate. The additional costs discussed in the other comments (i.e.: 4, 5, 6, 7, 9) will be included prior to applying the 1.4% interest rate. This will result in adding $32M to the calculated present value.				
406	DTSC-118	Non-design	Cost estimates	Post-Remedy Closeout		The cost does not include submission of reports to DTSC for review and approval which are necessary to complete close-out.	A line item with a value of $250,000 will be included in the post-remedy closeout estimate to account for close-out reporting preparation, submittal, and review. This task cannot be estimated precisely, as these costs would be incurred up to 50 years after remedy implementation, and reporting requirements, level of effort, and associated labor/materials costs cannot be accurately estimated. The post-remedy closeout estimate also includes a 25% contingency to				

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							reflect the uncertainty of this work.				
Specific Comments – 90% BOD Appendix A3: Mapping of OHWM and USACE/CDFW Jurisdictional Areas											
407	FMIT/TRC	Non-design	Request for Information	Append A3 Mapping of OHWM and USACE/CDFW Jurisdictional Areas	Pursuant to Mitigation Measure AES-2a, "A minimum setback requirement of 20 feet from the water (ordinary high water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank."	It appears that the placement of remedial infrastructure is based on being 20 feet back from OHWM. Please discuss if any of the infrastructure will be within the 100-year flood levels and if so how will the infrastructure be designed in the case that it is inundated with water?	Figure 2.4-4 of the BOD overlays the remedial infrastructure on a map of jurisdictional waters and wetlands. The following infrastructure is located in the 100-year floodplain: **Arizona -** Freshwater supply well HNWR-1A, contingent Site B well, associated equipment, and a portion of Pipeline B *All well heads (stick-ups) and equipment pads are designed to be above the regulatory base flood elevation of 465.3 feet NAVD. Pipeline B is belowground and does not require prevention or control of inundation by water.* **California -** Riverbank extraction well RB-5, monitoring well MW-W, a portion of Pipeline C, and a portion of the ring road in the floodplain *The 100-year flood elevation is 464' above MSL. The Riverbank extraction wells are placed at locations where the ground surface is above 464', though portions of the well vault and pipelines are located below that elevation. We do not expect significant volumes of water to enter the well vaults from the bottom of the vault due to rising water levels. The vaults include level switches to discontinue operation of the well if enough water enters the well vault. The southern portion of pipeline C to the crossing under National Trails Hwy (pipeline C Sta.*			Noted.	

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							17+00 to 27+00) will be constructed below ground and below 464 feet. The pipelines do not require any measures to protect the pipes from inundation of water.				
408	Hualapai/TRC	Non-design	Request for Information	Append A3 Mapping of OHWM and USACE/CDFW Jurisdictional Areas	Pursuant to Mitigation Measure AES-2a, "A minimum setback requirement of 20 feet from the water (ordinary high water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank."	It appears that the placement of remedial infrastructure is based on being 20 feet back from OHWM. Please discuss if any of the infrastructure will be within the 100-year flood levels and if so how will the infrastructure be designed in the case that it is inundated with water?	See above			Noted.	
409	Cocopah/TRC	Non-design	Request for Information	Append A3 Mapping of OHWM and USACE/CDFW Jurisdictional Areas	Pursuant to Mitigation Measure AES-2a, "A minimum setback requirement of 20 feet from the water (ordinary high water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank."	It appears that the placement of remedial infrastructure is based on being 20 feet back from OHWM. Please discuss if any of the infrastructure will be within the 100-year flood levels and if so how will the infrastructure be designed in the case that it is inundated with water?	See above			Noted.	
410	Chemehuevi/ TRC	Non-design	Request for Information	Append A3 Mapping of OHWM and USACE/CDFW Jurisdictional Areas	Pursuant to Mitigation Measure AES-2a, "A minimum setback requirement of 20 feet from the water (ordinary high	It appears that the placement of remedial infrastructure is based on being 20 feet back from OHWM. Please discuss if any of the infrastructure will be within the 100-year flood levels and if so how will the infrastructure be designed in the case that it is inundated with water?	See above			Noted.	

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					water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank."						
Specific Comments – 90% BOD Appendix B: Development of Groundwater Flow, Geochemical, and Solute Transport Models											
411	DTSC-119	Design	Editorial – GW Modeling	General		DTSC is concerned with the numerous groundwater modeling comments prepared by agencies and Tribes that touch on both the flow model as well as the fate and transport component. It is imperative that the model be improved to assist with future project decisions and ensure past ones were appropriate. DTSC concerns with the fate and transport modeling (e.g., byproduct mobility and persistence) have been documented as far back as the 30% and CMS stages of the remedy. Recent comments raise some of the same DTSC concerns from the past. These recent 90% comments coupled with the underestimation of byproduct migration (e.g., manganese) at PG&E Hinkley Compressor Station solidifies agency concerns. It would be a serious detriment to the project, including the schedule, should current conclusions made with the existing model change significantly. PG&E should make resolution of groundwater modeling comments a high priority.	Comment noted. For clarification byproduct Manganese was not discretely modeled at the PGE Hinkley Compressor Station, however the observed Mn at Hinkley was one of the key reasons Mn modeling was incorporated into the PGE Topock modeling.				
412	DOI-9	Non-design	GW Modeling	2.3/7	The groundwater at the Site is a sodium chloride-dominated type with a highly variable total dissolved solid (TDS), varying from about 1,000 milligrams per liter (mg/L) to greater than 10,000 mg/L, with the most frequent values ranging between about 4,000 (33rd percentile) to 7,000 mg/L (66th percentile) and a median value of about 5,000 mg/L based on the most recent site-wide TDS data collected through 12/31/2013In general, higher TDS levels are	A common problem with predicting density dependent flow is that the very high TDS concentrations can lead to errors in the calculations of equivalent freshwater heads due to the density (and even temperature) gradients within the monitoring wells. When the inward gradients created by the capture wells are so low (.001 to .003) please explain how the uncertainties associated with the density corrections are being addressed in the capture zone assessment?	PG&E has been monitoring water levels in the floodplain and applying density corrections (on the basis of salinity as well as temperature) to the data throughout the operation of IM-3. Though it is acknowledged that there are uncertainties associated with any form of density correction, the current method has been accepted by other technical reviewers over the course of the project and the calculated freshwater heads over time were used to calibrate the groundwater model. The inward gradient targets were assigned on the basis of the distribution of these calculated heads, and therefore the modeling and monitoring are internally consistent. Any alteration in freshwater head calculation would simply shift model, monitoring,		Accepted.		Comment resolved pending DOI review of the final design documents.

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					encountered in areas closer to the Colorado River and near the alluvium bedrock interface.		and target metrics in a similar way. See response to comment 733 for more information about density corrections.				
413	FMIT/TRC	Non-design	GW Modeling	Append B 3.3/ Page 15.	"The currently proposed design includes continuous operation of injection wells along the IRZ, which will allow for significantly higher injection volumes and greater radii of influence than could be achieved with the point injection method that was applied during the floodplain ISPT."	Was the seasonal variation in river stage (and associated fluctuations of groundwater in wells near the river) considered in maintaining hydraulic control for the final proposed 6/18 month on/off IRZ cycle (which will likely adjust based on "adaptive" decisions in the OM monitoring decision framework diagrams)? For example, during spring/summer - high river stage will cause heads to rise notably at extraction wells – which will reduce the gradient across the IRZ (even reversing it?). Did any of the optimization or sensitivity simulations consider benefits of maintaining a constant gradient across the IRZ year-round by adjustments to IRL and/or River extraction wells? Could the time to complete remediation be reduced in this way?	As described in Appendix B Section 7.4 the seasonal variation in river stage was considered with respect to the transport modeling and hydraulic control. Despite the seasonal stage fluctuations there was not a significant difference between the transient and the steady state flow and transport modeling. River stage and water levels will still be monitored to gauge relative impacts of local gradient fluctuations. Despite fluctuations in river stage, the groundwater flux through the NTH IRZ is primarily controlled through upgradient injection in IRL and FW injection wells, and to a lesser extent the riverbank extraction wells located downgradient. It is not anticipated that the river stage variation will have a significant impact on the flux through the NTH IRZ during both the on and off cycles of the NTH IRZ. Additionally, the overall remedial timeframe is controlled by the alluvial aquifer upgradient of the NTH IRZ, therefore local gradient fluctuations near the river will not likely have a significant impact on the remedial timeframe. PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated			It is still unclear whether fate/transport was simulated with time-varying river stage for the final proposed remediation design and operation. Time-varying stage only appears to have been simulated in one former (pre-final) design/operation - not similar to 6 month on/18 month off NTH IRZ injection/extraction system. Given the noted errors and issues with the model as outlined in Prucha and Eggers July 15, 2015 mw-x/mw-y whitepaper, we suggest re-assessing the importance/need to include fluctuating river stage, especially related to monitoring (done at specific times of the year, which are influenced by the stage at that time of year) compared to steady state simulated (constant) levels. The model should have been calibrated for all intended uses (i.e., assessing hydraulic gradients as specified in frameworks in OM Vol2, flow directions, capture zones etc.). Calibration results were never shown in an industry standard way (i.e., ASTM), so it's unclear what sort of spatial bias might exist in the current model. Therefore, this comment is considered unresolved.	DTSC response: In deference to Tribal cultural concerns, DTSC will consider various proposal made by the TRC on behalf of the Tribes to further evaluate the hydro- geological understanding , including additional work on the model. The agencies will provide direction to PG&E. It is important to note that DTSC does not completely agree with the technical basis or statements made by the TRC in their white paper and their rebuttal to PG&E's response. However, for the purpose of promoting progress on this project, DTSC will not debate those disagreements here.

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							August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.				
414	Hualapai/TRC	Non-design	GW Modeling	Append B 3.3/ Page 15.	"The currently proposed design includes continuous operation of injection wells along the IRZ, which will allow for significantly higher injection volumes and greater radii of influence than could be achieved with the point injection method that was applied during the floodplain ISPT."	Was the seasonal variation in river stage (and associated fluctuations of groundwater in wells near the river) considered in maintaining hydraulic control for the final proposed 6/18 month on/off IRZ cycle (which will likely adjust based on "adaptive" decisions in the OM monitoring decision framework diagrams)? For example, during spring/summer - high river stage will cause heads to rise notably at extraction wells – which will reduce the gradient across the IRZ (even reversing it?). Did any of the optimization or sensitivity simulations consider benefits of maintaining a constant gradient across the IRZ year-round by adjustments to IRL and/or River extraction wells? Could the time to complete remediation be reduced in this way?	See above			It is still unclear whether fate/ transport was simulated with time-varying river stage for the final proposed remediation design and operation Time-varying stage only appears to have been simulated in one former (pre-final) design/operation - not similar to 6 month on/18 month off NTH IRZ injection/extraction system. Given the noted errors and issues with the model as outlined in Prucha and Eggers July 15, 2015 mw-x/mw-y whitepaper, we suggest re-assessing the importance/need to include fluctuating river stage, especially related to monitoring (done at specific times of the year, which are influenced by the stage at that time of year) compared to steady state simulated (constant) levels. The model should have been calibrated for all intended uses (i.e., assessing hydraulic gradients as specified in frameworks in OM Vol2, flow directions, capture zones etc.). Calibration results were never shown in an industry standard way (i.e., ASTM), so it's unclear what sort of spatial bias might exist in the current model. Therefore, this comment is considered unresolved.	DTSC response: See RTC #413

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416	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 3.3/ Page 15.	"The currently proposed design includes continuous operation of injection wells along the IRZ, which will	Was the seasonal variation in river stage (and associated fluctuations of groundwater in wells near the river) considered in maintaining hydraulic control for the final proposed 6/18 month on/off IRZ cycle (which will likely adjust based on "adaptive" decisions in the OM monitoring decision framework diagrams)? For example, during spring/summer - high river stage will cause heads to rise notably at extraction wells – which will reduce the gradient across the IRZ (even reversing it?). Did any of the optimization or sensitivity simulations consider benefits of maintaining a constant gradient across the IRZ year-round by adjustments to IRL and/or River extraction wells? Could the time to complete remediation be reduced in this way?	See above			It is still unclear whether fate/ transport was simulated with time-varying river stage for the final proposed remediation design and operation	DTSC response: See RTC #413

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					allow for significantly higher injection volumes and greater radii of influence than could be achieved with the point injection method that was applied during the floodplain ISPT.”					Time-varying stage only appears to have been simulated in one former (pre-final) design/operation - not similar to 6 month on/18 month off NTH IRZ injection/extraction system. Given the noted errors and issues with the model as outlined in Prucha and Eggers July 15, 2015 mw-x/mw-y whitepaper, we suggest re-assessing the importance/need to include fluctuating river stage, especially related to monitoring (done at specific times of the year, which are influenced by the stage at that time of year) compared to steady state simulated (constant) levels. The model should have been calibrated for all intended uses (i.e., assessing hydraulic gradients as specified in frameworks in OM Vol2, flow directions, capture zones etc.). Calibration results were never shown in an industry standard way (i.e., ASTM), so it’s unclear what sort of spatial bias might exist in the current model. Therefore, this comment is considered unresolved.	
417	DOI-10	Design	Remedial Design	3.4.1/16	Although the maximum concentrations of TOC utilized in the ISPTs were high, the test results indicate that effective Cr(VI) treatment can be achieved with relatively low TOC concentrations. For example, Cr(VI)	It’s not clear how this conclusion is being drawn. Figure 3.4-1 shows that the drop in Cr(VI) concentrations follows a large spike in TOC concentrations. Furthermore, the authors’ of the of the floodplain ISPT study conclude that a sustained concentration of 100 mg/L is required for successful remediation of the Cr(VI) as noted in Section 5.2.1.3 (p. 14) of the ISPT report: *“Delivery of a sufficient amount of TOC was important for achieving complete Cr(VI) reduction to below the reporting limit of 0.2 mg/L. Reductions of this magnitude occurred only in locations where sufficient TOC was delivered, as indicated by sustained TOC concentrations above 100 mg/L for at least a few weeks. The delivery of sufficient TOC was limited to the injection well during the first three injections. Cr(VI) concentrations following these injections dropped below the reporting limit only in PTI-1D, where TOC concentrations of up to 204 mg/L were observed. In contrast, the decrease in Cr(VI) levels in downgradient wells as a result of the first three injections was notable but not as extensive. Cr(VI) concentrations remained above 450 mg/L in PT-1D and PT-2D, where less TOC was delivered and maximum TOC concentrations reached less than 100 mg/L (the maximum TOC concentrations were 58.4 and 26.9 mg/L, respectively).”* Presumably higher sustained TOC concentrations would be required in the upland areas where the	The "spike" TOC concentrations associated with the first three injections as shown on Figure 3.4-1 are in the 50 mg/L range (please note that the TOC concentrations are shown on the right hand vertical axis). The comment author is correct that the floodplain in situ pilot test (ISPT) concluded that sustained TOC		Accepted		Resolved.

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					concentrations decreased to below 5 ug/L in the floodplain ISPT (monitoring well PT-1D) within the first three of six injection events with observed TOC concentrations between 10 and 50 mg/L (Figure 3.4-1).	prevailing conditions are not as reducing and background TOC concentrations not as high. Since the TOC dosing in the IRL will be a maximum of 50 mg/L please provide additional justification that this dosing rate will be effective.	concentrations over 100 mg/L were needed to stimulate reduction. An amount of electrons/organic carbon equivalent to the 100 mg/L TOC that was sustained for several weeks can be delivered at a lower concentration for a longer period of time with a continuously operating system such as the in situ reactive zone (IRZ) systems for the final remedy. These IRZ systems will be operated continuously for months at a time. Lower dosing amounts are required for the Inner Recirculation Loop (IRL), versus the NTH IRZ, because the primary objective is to treat Cr(VI) that may be present in the extracted groundwater that is being re-injected in the upland areas. This differs from the primary objective of the NTH IRZ—i.e., to distribute enough organic carbon between injection wells to stimulate Cr(VI) reduction. As was discussed in the response to Comment #110 (DTSC-36) on the 30% Design, approximately 3.4 mg/L of TOC from ethanol would be required to reduce 8 mg/L of oxygen, 2 mg/L nitrate as nitrogen, and 13 ppb Cr(VI). The 50 mg/L upper end of the TOC dosing range for the IRL was established above this concentration to allow for additional consumption of TOC for cell growth, promotion of reducing conditions in the subsurface, and to accommodate for uncertainties in field implementation.				
418	DOI-11	Design	GW Modeling	3.4.1/19	The solute	In light of the discussion pertaining to the apparent TOC concentrations required for reduction of	The concentration of		Accepted.		Resolved.

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					transport model (described below; see Section 6) assumes Cr(VI) reduction in the presence of organic carbon above 0.1 mg/L.	CR(VI) (100 mg/L) it is difficult to see why this assumption is made particularly since the reporting limits for the TOC are 1 mg/L. Please provide justification for the 0.1 mg/L TOC assumption.	TOC needed to establish chromium-reducing conditions given a continuous injection system will be different than that needed to establish chromium-reducing conditions during the discrete injection pilot test. The 0.1 mg/L TOC threshold was established as the minimum carbon concentration to support microbial growth and Cr(VI) reduction through a series of sensitivity analyses for other Cr(VI) impacted sites where Cr(VI) reduction using a large-scale recirculation system had been observed (i.e., PG&E Hinkley Compressor Station site). During continuous injections at Hinkley, the 0.1 mg/L threshold was well-correlated to the zone of Cr(VI) reduction. This analysis was done by fitting the chromium reduction data and available TOC data above the reporting limit, which allowed for the determination of the threshold below the reporting limit. The lower 0.1 mg/L also allows the model to account for potential lysis effects where carbon from previous microbial communities is essentially recycled to support further microbial growth. A sensitivity analysis was also performed on the trigger TOC level for Cr(VI) reduction to evaluate potential effects. As discussed in Section 10.15 of Appendix B, the TOC threshold concentration was increased an order of magnitude to 1 mg/L. At this higher TOC				

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							threshold, sufficient Cr(VI) reduction was achieved. The model predicted potential Cr(VI) breakthrough along the NTH IRZ line at the 10-year mark during the IRZ OFF cycle. However, much of this Cr(VI) is treated during the subsequent IRZ ON cycle, and the model results are comparable for the 0.1 and 1 mg/L TOC triggers at 30 years. Potential operational adjustments to address a higher TOC threshold concentration are described in Table 6.6-1 of Appendix B and include the following (primarily applicable to the NTH IRZ): adjust TOC dosing concentration, frequency, and/or duration; and activation of provisional wells to bolster lateral coverage. A memo which provides supporting information regarding the development of the simulated threshold TOC concentration for reduction of Cr(VI) is provided in **Attachment L** of the final RTC table as requested by DOI.				
419	DOI-12	Design	GW Modeling	3.4.3/19	Given this observation, it was possible to derive an arsenic attenuation rate from the ISPT data for use in the solute transport model. Based on these results, an	The tracer test data provides additional insight that suggests a better conceptualization of the arsenic mobility would be similar to that used for chromium in which a certain TOC concentration is assumed to mobilize the arsenic. A concern with using the tracer test data to calculate arsenic attenuation rates is that; as noted on page 11 of the study: "*In contrast, tracer data at PT-2D (Figure 9) indicate breakthrough occurred a period of time after the injection period for all six injections.*" The cause for this apparent anomalous result is never discussed. Furthermore, iodide was injected in May and September of 2006 and in July 2007. The largest iodide peak arrived in PT-2D around May 20, 2007 (Figure 9- main report). Since the last iodide injection before this arrival was in September 2006 apparently it took 8 months for the iodide (a conservative tracer) to arrive. Something does not seem right and it leads some doubt to the interpretation of arsenic attenuation using assumed travel times. Furthermore, the iodide spike was accompanied by a spike in TOC, a sharp increase in dissolved iron, arsenic and hex chrome. It seems pretty clear that the arsenic solubility (as indicated throughout the text in Appendix B) is controlled by how reducing the aquifer conditions are. Please explain why the arsenic is not being modeled in a similar fashion to the manganese and linked to TOC concentrations through proportionality constant. Attenuation rates for the arsenic that are independent of the prevailing geochemistry of the aquifer do not appear to be well supported by the data. As noted in Section 3.4.3 (p. 18); "*The ISPT results demonstrated that the amount of byproducts (manganese, arsenic, iron, and barium) liberated within the IRZ are proportional to the strength of the reducing environment created by TOC injection, which, in turn, is proportional to the concentrations of TOC used.*" Furthermore, the use of a half-life to model potentially reversible reactions also does not fit the geochemical conceptual	The comment author is correct—there was an error in Table 2 of the floodplain ISPT report identifying which tracers were used for the May 2007 and July 2007 injection events. As the analytical data in Table 9 show for injection solution #3, the May 7-8, 2007 injection event did in fact use iodide, which was detected downgradient at PT-2D later in May 2007. The data from the first four volume injection events are still valid for evaluating arsenic attenuation rates.		Accepted.		Resolved.

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					arsenic attenuation half-life of between 20 and 40 days was calculated (base-case half-life assigned as 30 days), assuming a PT-2D arsenic concentration between 2.5 and 5 µg/L.	model. The application of a half-life will permanently remove the arsenic from both the sorbed and mobile phase. In reality, the arsenic is partitioning to the sorbed phase but could be remobilized if the TOC concentrations increase and the conditions become more reducing.	It is important to distinguish between the conceptual models for byproduct generation and byproduct attenuation, which are treated as decoupled processes in the geochemical and solute transport models. Specifically, Section 3.4.3 describes the basis for arsenic generated within the IRZ—it is in fact treated the same way as manganese. Manganese and arsenic are both generated within the IRZ at levels proportional to the TOC concentration, with generation coefficients of 0.016 mg manganese per mg TOC and 0.000108 mg arsenic per mg TOC. Downgradient of the IRZ, within the floodplain, the attenuation of manganese and arsenic are treated differently based on the anticipated geochemical mechanisms controlling uptake. However, manganese and arsenic attenuation processes are not activated within the maximum simulated 1 mg/L TOC footprint; i.e., manganese and arsenic do not attenuate in the model within the IRZ footprint, but only downgradient of it. In this way, arsenic and manganese attenuation are still dependent on the redox conditions within the aquifer. This is consistent with the co-occurrence of elevated TOC, dissolved iron, and arsenic observed at PT-2D during the pilot test. The rate-limited coprecipitation reaction of arsenic with iron oxides, with associated adsorption, is				

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							documented in the literature (Waychunas et al., 1993; Fuller et al., 1993). However, as described in Section 5.4.2, is an attenuation mechanism that cannot be described by a simple adsorption isotherm such as that of manganese. Observed arsenic data from the pilot study support this, yet for simplicity a simpler time-dependent relationship is included in the model to empirically mimic the more complex process that takes place. Although it is true that the half-life relationship is not reversable, this is what would be observed in the aquifer in the absence of a switch to more reducing conditions in the Alluvial Aquifer downgradient of injection (which is not predicted by the conceptual model or geochemical modeling). In summary, arsenic and manganese are modeled in the same way with respect to TOC content (both in terms of generation and lack of attenuation within the IRZ). Because it may not have been explicitly clear that manganese and arsenic attenuation only occur outside of the IRZ, the following text will be added to Section 6.2.7 between the third and fourth paragraphs: "Downgradient of the IRZ within the floodplain, manganese attenuation is modeled via adsorption, whereas arsenic attenuation is modeled via rate-limited co-precipitation according to a given half-life. These processes are assumed				

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							not to occur within the IRZ itself, instead taking effect within the redox recovery zone downgradient of the IRZ. In the solute transport model, this process is captured by activating the manganese and arsenic attenuation mechanisms outside of the maximum simulated 1 mg/L TOC footprint." References: Waychunas, GA, BA Rea, CC Fuller, JA Davis. 1993. Surface chemistry of ferrihydrite: Part 1. EXAFS studies of the geometry of coprecipitated and adsorbed arsenate. *Geochimica et Cosmochimica Acta* 57 (10), 2251-2269 Fuller, CC, JA Davis, and GA Waychunas. 1993. Surface chemistry of ferrihydrite: Part 2. Kinetics of arsenate adsorption and coprecipitation. Geochimica et Cosmochimica Acta 57 (10), 2271-2282				
420	DOI-13	Design	GW Modeling	3.4.4/19	Aquifer mobile porosity estimates were obtained from the floodplain ISPT during tracer injection. These results, which are described in detail and presented in Table 6 of the Floodplain ISPT Final Completion Report (ARCADIS 2008), indicate a mobile porosity of 12%.	ARCADIS (2008) presents two methods for calculating the effective porosity from the tracer test data; the method that they term "Ratio of Velocity" as well as a second method they refer to as a "Radius of Influence" (ROI) method. The ratio of velocity method basically uses the peak arrival time of the tracer in conjunction with the hydraulic gradients and hydraulic conductivities to back out the mobile porosity. The Ratio of Velocity results from the ARCADIS tracer test indicate an effective porosity of 0.02 and 0.005 percent. ARCADIS presents another method "Radius of Influence" which they describe as *"During tracer injection, transport occurred primarily by displacement of the tracer solution away from the injection well screen. As an approximation, radial transport away from the injection well over the length of the screened interval was assumed. As a result, tracer observed in nearby monitoring wells during an injection period can be used to estimate the mobile-phase effective porosity of the aquifer."* The results from this analysis are shown in Table 6 of the report to be 12% for all three wells. The ROI method is based on measuring the injected volume and tracking the tracer concentrations in the dose-response wells. For this method to provide representative results, however, the tracer concentrations at the dose-response wells should be near the injected concentrations. For the wells where mobile porosities were calculated with the ROI method; PT-1D, PT-3D and PT-4D the relative concentrations of the injected tracer was approximately 0.4, 0.4 and less than 0.02, respectively. These relative tracer concentrations suggest that there may be significant issues with the calculated mobile porosities. ARCADIS (2008), however, does not present any of supporting calculations for how the 12% effective porosity was derived. Please provide the actual calculations, and discuss the uncertainty in the results and potential impacts on the predicted range of remediation times.	The Radius of Influence calculations are consistent with methods discussed in Remediation Hydraulics (Payne et al., 2008). The method provides a more measure of mobile porosity and is more accurate as compared to the Ratio of Velocity method. For the first small volume (6000 gallon injection) the ROI was approximately 15 ft, as indicated by strong arrival at PT-3D versus PT-1D. The mobile porosity is computed by dividing the injected volume by the volume of impacted aquifer ($\pi * r^2 * h$) (where r = radius of influence in the aquifer and h = screen		Accepted.		Comment resolved pending DOI review of the final design documents.

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							length). For PT-3D the resultant mobile porosity = 12%. Particle tracking with the groundwater flow model was also indicative of a 12% mobile porosity for the pilot testing in this area (CH2M HILL 2009, CMS/FS Report, Appendix F). For the six large volume injection of 18,000 gallons, the ROI was approximately 25 ft based on the arrival of tracer at PT-4D which yields 12% mobile porosity as well. Arrival concentrations were less than the injected concentrations likely due to heterogeneous advection in the aquifer that may influence the distribution of tracer in the aquifer. Although aspects of the tracer test were not ideal (monitoring frequency, breakthrough concentration), the results of the tracer test are still supportive of a 12% effective porosity which is consistent with effective porosities for similar lithologies. In addition to the ROI calculations from the pilot test, a mobile porosity of 12% was also calculated through the evaluation of the breakthrough of TDS and specific conductivity in deep monitoring wells in the vicinity of the IM-3 wells (CH2M HILL 2009, CMS/FS Report, Appendix F). This analysis showed good correlation between observed and simulated TDS arrival times and the range in effective porosity calculated from three different wells was between 11% and 14%. The observation				

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							wells ranged from approximately 40 ft to 200 ft away from the injection well and the monitoring duration extended up to 200 days yielding a comprehensive data set. This additional support of the 12% mobile porosity will be added to the 100% Design text. As there is uncertainty associated with these mobile porosity calculations, an additional porosity sensitivity analysis will be added to Appendix B Section 10 as described in comment # 441.				
421	FMIT/TRC	Non-design	GW Modeling	Append B 4.0/ Page 21	"Additional modifications to the groundwater flow model include the incorporation of additional hydrogeologic data developed during the installation of the HNWR-1A well, about 75 feet from HNWR-1, and the Site B well located about 3,300 feet to the north of HNWR-1."	A new USGS model "*Fred D Tillman, Bradley D. Garner, and Margot Truini, 2013. Preliminary Groundwater-Flow Model of the Basin-Fill Aquifers in Detrital, Hualapai, and Sacramento Valleys, Mohave County, Northwestern Arizona. Scientific Investigations Report 2013–5122*" includes Sacramento wash and these two wells. Do the modifications (hydraulic property distributions, aquifer thickness etc.) to the MicroFEM model in this area (HNWR-1 and Site B) compare well to the USGS model inputs/results? If not, will the MicroFEM model be updated?	The USGS 2013 Model will be considered in future model updates, but unfortunately due to the scale of the regional USGS model, it has limited utility for providing data on the refined scale needed for our model. The Colorado River forms the western boundary of the USGS model, so the bulk of our area of concern is outside the USGS model domain. Additionally the regional USGS model is only a 1 layer flow model with 1,000 m x 1,000 m grid cells so resolution is limited. The USGS model also uses a single arbitrary bottom elevation for the entire model domain. The USGS model area that contains HNWR-1, HNWR-1A, and Site B well has comparable K values to the Topock model and similar water level patterns. However, reported USGS water level residuals in this area range from -25 ft to 100 ft. Due to the size of the USGS model, the calibration isn't refined in our area of interest.			The USGS model overlaps the regional MicroFEM model domain. Prucha and Eggers (July 15, 2015 whitepaper) point out a number of issues with the model setup & boundary conditions. In particular, simulated ET losses are very likely at least an order of magnitude too low, and the 100 ac-ft/yr inflow prescribed from Sacramento Wash into the MicroFEM model appears at least an order of magnitude too low based on this publication (i.e., this is only ~62 gpm from a watershed that exceeds 1300 square miles) and river-aquifer exchange is incorrectly simulated within Arizona. Instead of focusing on comparing simulated water balances, PG&E consultants focus on modeled residuals, which have not been shown in standard ASTM format for either the MicroFEM or Modlow models (i.e., simulated vs. observed graphs, or residuals plotted spatially by	DTSC response: Agencies will provide direction to PG&E in separate letter.

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							PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			layer). Providing this information would increase confidence in the model which was used as THE primary basis designing the proposed remedy. We recommend that PG&E consultants contact Tilman/Truini, et al., at USGS and discuss model parameterization, basis for input, results and see whether the conclusions here are valid. The USGS developed a model of a very large area, with considerable supporting information that PG&E consultants have not considered.	
422	Hualapai/TRC	Non-design	GW Modeling	Append B 4.0/ Page 21	"Additional modifications to the groundwater flow model include the incorporation of additional hydrogeologic data developed during the installation of the HNWR-1A well, about 75 feet from HNWR-1, and the Site B well located about 3,300 feet to the north of HNWR-1."	A new USGS model "*Fred D Tillman, Bradley D. Garner, and Margot Truini, 2013. Preliminary Groundwater-Flow Model of the Basin-Fill Aquifers in Detrital, Hualapai, and Sacramento Valleys, Mohave County, Northwestern Arizona. Scientific Investigations Report 2013–5122*" includes Sacramento wash and these two wells. Do the modifications (hydraulic property distributions, aquifer thickness etc.) to the MicroFEM model in this area (HNWR-1 and Site B) compare well to the USGS model inputs/results? If not, will the MicroFEM model be updated?	See above			The USGS model overlaps the regional MicroFEM model domain. Prucha and Eggers (July 15, 2015 whitepaper) point out a number of issues with the model setup & boundary conditions. In particular, simulated ET losses are very likely at least an order of magnitude too low, and the 100 ac-ft/yr inflow prescribed from Sacramento Wash into the MicroFEM model appears at least an order of magnitude too low based on this publication (i.e., his is only ~62 gpm from a watershed that exceeds 1300 square miles) and river-aquifer exchange is incorrectly simulated within Arizona. Instead of focusing on comparing simulated water balances, PG&E consultants focus on modeled residuals, which have not been shown in standard ASTM format for either the MicroFEM or Modlow models (i.e., simulated vs. observed	DTSC response: Agencies will provide direction to PG&E in separate letter.

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										graphs, or residuals plotted spatially by layer). Providing this information would increase confidence in the model which was used as THE primary basis designing the proposed remedy. We recommend that PG&E consultants contact Tilman/Truini et al at USGS and discuss model parameterization, basis for input, results and see whether the conclusions here are valid. The USGS developed a model of a very large area, with considerable supporting information that PG&E consultants have not considered.	
423	Cocopah/TRC	Non-design	GW Modeling	Append B 4.0/ Page 21	"Additional modifications to the groundwater flow model include the incorporation of additional hydrogeologic data developed during the installation of the HNWR-1A well, about 75 feet from HNWR-1, and the Site B well located about 3,300 feet to the north of HNWR-1."	A new USGS model "*Fred D Tillman, Bradley D. Garner, and Margot Truini, 2013. Preliminary Groundwater-Flow Model of the Basin-Fill Aquifers in Detrital, Hualapai, and Sacramento Valleys, Mohave County, Northwestern Arizona. Scientific Investigations Report 2013–5122*" includes Sacramento wash and these two wells. Do the modifications (hydraulic property distributions, aquifer thickness etc.) to the MicroFEM model in this area (HNWR-1 and Site B) compare well to the USGS model inputs/results? If not, will the MicroFEM model be updated?	See above			The USGS model overlaps the regional MicroFEM model domain. Prucha and Eggers (July 15, 2015 whitepaper) point out a number of issues with the model setup & boundary conditions. In particular, simulated ET losses are very likely at least an order of magnitude too low, and the 100 ac-ft/yr inflow prescribed from Sacramento Wash into the MicroFEM model appears at least an order of magnitude too low based on this publication (i.e., this is only ~62 gpm from a watershed that exceeds 1300 square miles) and river-aquifer exchange is incorrectly simulated within Arizona. Instead of focusing on comparing simulated water balances, PG&E consultants focus on modeled residuals, which have not been shown in standard ASTM format for either the MicroFEM or	DTSC response: Agencies will provide direction to PG&E in separate letter.

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										Modlow models (i.e., simulated vs. observed graphs, or residuals plotted spatially by layer). Providing this information would increase confidence in the model which was used as THE primary basis designing the proposed remedy. We recommend that PG&E consultants contact Tilman/Truini et al at USGS and discuss model parameterization, basis for input, results and see whether the conclusions here are valid. The USGS developed a model of a very large area, with considerable supporting information that PG&E consultants have not considered.	
424	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 4.0/ Page 21	“Additional modifications to the groundwater flow model include the incorporation of additional hydrogeologic data developed during the installation of the HNWR-1A well, about 75 feet from HNWR-1, and the Site B well located about 3,300 feet to the north of HNWR-1.”	A new USGS model "*Fred D Tillman, Bradley D. Garner, and Margot Truini, 2013. Preliminary Groundwater-Flow Model of the Basin-Fill Aquifers in Detrital, Hualapai, and Sacramento Valleys, Mohave County, Northwestern Arizona. Scientific Investigations Report 2013–5122*" includes Sacramento wash and these two wells. Do the modifications (hydraulic property distributions, aquifer thickness etc.) to the MicroFEM model in this area (HNWR-1 and Site B) compare well to the USGS model inputs/results? If not, will the MicroFEM model be updated?	See above			The USGS model overlaps the regional MicroFEM model domain. Prucha and Eggers (July 15, 2015 whitepaper) point out a number of issues with the model setup & boundary conditions. In particular, simulated ET losses are very likely at least an order of magnitude too low, and the 100 ac-ft/yr inflow prescribed from Sacramento Wash into the MicroFEM model appears at least an order of magnitude too low based on this publication (i.e., this is only ~62 gpm from a watershed that exceeds 1300 square miles) and river-aquifer exchange is incorrectly simulated within Arizona. Instead of focusing on comparing simulated water balances, PG&E consultants focus on modeled residuals, which have not been shown in standard	DTSC response: Agencies will provide direction to PG&E in separate letter.

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										ASTM format for either the MicroFEM or Modlow models (i.e., simulated vs. observed graphs, or residuals plotted spatially by layer). Providing this information would increase confidence in the model which was used as THE primary basis designing the proposed remedy. We recommend that PG&E consultants contact Tilman/Truini et al at USGS and discuss model parameterization, basis for input, results and see whether the conclusions here are valid. The USGS developed a model of a very large area, with considerable supporting information that PG&E consultants have not considered.	
425	FMIT/TRC	Non-design	GW Modeling	Append B 4.3/ P. 22	"The model contains 232 rows, 256 columns, and five layers for a total of 296,960 active cells (Figure 4.2-1). A uniform cell size of 25 feet by 25 feet occurs throughout the entire sub model domain. The boundaries of the model grid are defined as constant flux cells that reflect the flux of the original groundwater flow model under the same flow conditions."	This suggests constant (steady state) fluxes from the regional MicroFEM model were assigned to the local Modflow model boundaries. If so, simulated mounding from IRL-5 injection clearly shows heads/flow paths change along the boundary. This implies that internal calculations are affected by this western constant flux boundary. What are the implications on model predictions if the time-varying IRL-5 injection influence on the western boundary weren't considered here?	Pumping well locations and rates were incorporated into the regional model to generate the boundary conditions for the submodel in order to account for the influence of pumping. The most sensitive wells in influencing the boundary conditions are FW-1 and HNWR-1 (outside submodel domain) due to the proximity to the submodel extents. However, the effects from the other remedial wells (i.e. IRL wells, FW-2) were considered as well as they influence boundary conditions to a lesser extent. In order to account for potential time variant flow in the steady state model, long term average flow rates were utilized to represent the long term hydraulic impact of pumping wells on the			Regional well production external to the regional model is not likely considered, but could easily affect internal 'regional' flows calculated by microFEM model, which translate to local model. Review of 60% local model files suggests that translation of regional model flows to local model (modflow) is not done through constant flux cells, but rather constant head cells. These are two different types of boundary conditions. Specifying constant head boundary conditions, instead of constant flux, will result in differences in water balance/ inflows/ outflows between the two models. This should be re-evaluated/ restated.	DTSC response: Agencies will provide direction to PG&E in separate letter.

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							local flow field as well as the development of the fluxes along the submodel perimeter. PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			Consideration should be given for simulating transient simulations, with appropriate regional to local transient boundary conditions to better simulate actual transient system behavior (i.e., flow gradients, magnitudes, levels, fate/transport etc.), especially during NTH IRZ on/off cycles. This should improve estimates of expected gradients, water levels and concentration trends heavily relied upon in decision framework diagrams outlined in O&M Vol 2 report (Tables 2.1-4 and 2.1-5) and Figures 2.2-2 through 2.2-9. This is important, because it will aid interpretations/ understanding and help reduce the potential need for new wells and reducing mistakes (i.e. modifying the wrong operational 'knobs', or adjusting them the wrong way or amount).	
426	Hualapai/TRC	Non-design	GW Modeling	Append B 4.3/ P. 22	"The model contains 232 rows, 256 columns, and five layers for a total of 296,960 active cells (Figure 4.2-1). A uniform cell size of 25 feet by 25 feet occurs throughout the entire sub model domain. The boundaries of the model grid are defined as constant flux cells that reflect the flux of the original groundwater flow model	This suggests constant (steady state) fluxes from the regional MicroFEM model were assigned to the local Modflow model boundaries. If so, simulated mounding from IRL-5 injection clearly shows heads/flow paths change along the boundary. This implies that internal calculations are affected by this western constant flux boundary. What are the implications on model predictions if the time-varying IRL-5 injection influence on the western boundary weren't considered here?	See above			Regional well production external to the regional model is not likely considered, but could easily affect internal 'regional' flows calculated by microFEM model, which translate to local model. Review of 60% local model files suggests that translation of regional model flows to local model (modflow) is not done through constant flux cells, but rather constant head cells. These are two different types of boundary conditions. Specifying constant head boundary conditions, instead of constant flux, will result in differences in water	DTSC response: Agencies will provide direction to PG&E in separate letter.

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					under the same flow conditions."					balance/inflows/outflows between the two models. This should be re-evaluated/restated. Consideration should be given for simulating transient simulations, with appropriate regional to local transient boundary conditions to better simulate actual transient system behavior (i.e., flow gradients, magnitudes, levels, fate/transport etc.), especially during NTH IRZ on/off cycles. This should improve estimates of expected gradients, water levels and concentration trends heavily relied upon in decision framework diagrams outlined in O&M Vol 2 report (Tables 2.1-4 and 2.1-5) and Figures 2.2-2 through 2.2-9. This is important, because it will aid interpretations/ understanding and help reduce the potential need for new wells and reducing mistakes (i.e. modifying the wrong operational 'knobs', or adjusting them the wrong way or amount).	
427	Cocopah/TRC	Non-design	GW Modeling	Append B 4.3/ P. 22	"The model contains 232 rows, 256 columns, and five layers for a total of 296,960 active cells (Figure 4.2-1). A uniform cell size of 25 feet by 25 feet occurs throughout the entire sub model domain. The boundaries of the model grid are defined as constant flux	This suggests constant (steady state) fluxes from the regional MicroFEM model were assigned to the local Modflow model boundaries. If so, simulated mounding from IRL-5 injection clearly shows heads/flow paths change along the boundary. This implies that internal calculations are affected by this western constant flux boundary. What are the implications on model predictions if the time-varying IRL-5 injection influence on the western boundary weren't considered here?	See above			Regional well production external to the regional model is not likely considered, but could easily affect internal 'regional' flows calculated by microFEM model, which translate to local model. Review of 60% local model files suggests that translation of regional model flows to local model (modflow) is not done through constant flux cells, but rather constant head cells. These are two different types of boundary conditions.	DTSC response: Agencies will provide direction to PG&E in separate letter.

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					cells that reflect the flux of the original groundwater flow model under the same flow conditions.”					Specifying constant head boundary conditions, instead of constant flux, will result in differences in water balance/inflows/outflows between the two models. This should be re-evaluated/restated. Consideration should be given for simulating transient simulations, with appropriate regional to local transient boundary conditions to better simulate actual transient system behavior (i.e., flow gradients, magnitudes, levels, fate/transport etc.), especially during NTH IRZ on/off cycles. This should improve estimates of expected gradients, water levels and concentration trends heavily relied upon in decision framework diagrams outlined in O&M Vol 2 report (Tables 2.1-4 and 2.1-5) and Figures 2.2-2 through 2.2-9. This is important, because it will aid interpretations/understanding and help reduce the potential need for new wells and reducing mistakes (i.e. modifying the wrong operational 'knobs', or adjusting them the wrong way or amount).	
428	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 4.3/ P. 22	“The model contains 232 rows, 256 columns, and five layers for a total of 296,960 active cells (Figure 4.2-1). A uniform cell size of 25 feet by 25 feet occurs throughout the entire sub model domain.	This suggests constant (steady state) fluxes from the regional MicroFEM model were assigned to the local Modflow model boundaries. If so, simulated mounding from IRL-5 injection clearly shows heads/flow paths change along the boundary. This implies that internal calculations are affected by this western constant flux boundary. What are the implications on model predictions if the time-varying IRL-5 injection influence on the western boundary weren’t considered here?	See above			Regional well production external to the regional model is not likely considered, but could easily affect internal 'regional' flows calculated by microFEM model, which translate to local model. Review of 60% local model files suggests that translation of regional model flows to local model (modflow) is not done through	DTSC response: Agencies will provide direction to PG&E in separate letter.

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					The boundaries of the model grid are defined as constant flux cells that reflect the flux of the original groundwater flow model under the same flow conditions."					constant flux cells, but rather constant head cells. These are two different types of boundary conditions. Specifying constant head boundary conditions, instead of constant flux, will result in differences in water balance/inflows/outflows between the two models. This should be re-evaluated/restated. Consideration should be given for simulating transient simulations, with appropriate regional to local transient boundary conditions to better simulate actual transient system behavior (i.e., flow gradients, magnitudes, levels, fate/transport etc.), especially during NTH IRZ on/off cycles. This should improve estimates of expected gradients, water levels and concentration trends heavily relied upon in decision framework diagrams outlined in O&M Vol 2 report (Tables 2.1-4 and 2.1-5) and Figures 2.2-2 through 2.2-9. This is important, because it will aid interpretations/understanding and help reduce the potential need for new wells and reducing mistakes (i.e. modifying the wrong operational 'knobs', or adjusting them the wrong way or amount).	
429	DOI-14	Design	GW Modeling	4.4/23	In order to properly translate groundwater flow conditions from the regional model to the extracted submodel, constant flux	Apparently, the regional model is being used to establish the flux boundary conditions for both the steady-state and pumping scenarios of the local model. This step is important because of the head changes that are observed at the local grid boundaries due to the pumping/injecting. Flux boundaries calculated from the non-pumping regional model would not adequately simulate the water moving across the boundary under pumping/injection conditions. This process of how the regional model output is being used (for the pumping scenarios) as input to the local model needs to be better described in Appendix B. Please be sure to specify if this handoff of fluxes from the regional model to the local model is <u>not</u> done for any of the pumping simulations or sensitivity analyses.	The regional MicroFEM model was used to generate flux boundaries for the submodel under both ambient (non-pumping) and active pumping scenarios. All of the pumping in the submodel was in the regional model, so the effects of that pumping		Accepted.		

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					boundaries were simulated around the edges of the extracted submodel.		are reflected in the boundary conditions. Text will be clarified to reflect this process.				
430	DOI-15	Design	GW Modeling	4.4/23	In order to properly translate groundwater flow conditions from the regional model to the extracted submodel, constant flux boundaries were simulated around the edges of the extracted submodel.	As described in CH2M HILL 2005 the regional model was calibrated to transient flow data and qualitatively to chromium plume development. Since there is not a good way to directly check that the fluxes from the regional model are being properly integrated into the local model or whether the changes made to the local model have affected the overall calibration there needs to be some quantitative check between the two models. On February 11, 2015 Martin Barackman (CH2MHill) emailed a comparison of the groundwater contours of the local and regional models to David Back (DOI consultant) (attached). Mr. Barackman states "The attached figures show that water level match between the two models is generally within a foot in the area north of the freeway, where most of the plume is present. The match is less good in the southwest corner of the model. In this area of the model, where the alluvium pinches out against bedrock, the MicroFEM grid cells are large and the layer thicknesses are small. Both of these factors add to the imprecision of the interpolation process. In summary, PG&E believes the process of translation between the MicroFEM and MODFLOW models produces two models with hydraulic properties and gradients similar enough to be used for the purposes of remedial design." Although there is a general agreement between the contours, according to Appendix L, the gradients necessary to maintain capture are on the order of 0.003 which is incredibly flat and small differences in the water-level elevations can have a significant impact. Furthermore it is unknown what the impacts of the differences in gradients will have on remediation times and flow directions. Based on the CH2M HILL 2005 report the calibrated regional model provides an excellent match to the monthly water levels in the flood plain wells (Figure B-2). Based on the potentiometric map comparison provided by Mr. Barackman, it does not look like the local model is calibrated nearly as well. Some type of quantitative check needs to be presented on how well the local model is calibrated. The potentiometric maps provided by Mr. Barackman should be included in Appendix B to provide a visual comparison of the regional and local model predictions.	A figure will be provided in Appendix B that compares the regional model simulated water levels to the submodel simulated water levels. Specific calibration targets from future model calibrations will also be evaluated in both the regional and submodel for a more quantitative evaluation, in accordance with the schedule identified in Appendix B Section 12. An additional paragraph will be added to Appendix B Section 12 to discuss the intended future use of the model including updating remediation time frame estimates, supporting capture zone analyses, and analyzing potential remedy design operation changes.		Accepted.		Comment resolved pending DOI review of the final design documents.
431	DOI-16	Design	GW Modeling	4.4/23	In order to properly translate groundwater flow conditions from the regional model to the extracted submodel, constant flux boundaries were simulated around the edges of the extracted submodel.	Moving forward this approach of only calibrating the regional model and using the results to parameterize and set the boundaries on the local model will become more and more problematic as additional data become available. Once the remedial system is up and running additional transient and steady state data sets will become available to fine tune the calibration, optimize the injection/pumping and predict capture zones. A significant degree of the regional model calibration is being lost in translation to the local model. The local model is uniformly spaced at 25 feet with the total number of active cells at less than 300,000. It seems that if a variably spaced grid was employed with additional nodes the local model boundaries could be extended to where the boundary effects would be minimal. This would allow the more traditional approach of using the regional model to set the boundaries on the local model but continue to calibrate only the local model. The boundary conditions could also be changed from the constant flux to General Head Boundaries to further minimize potential boundary effects.	The process for extracting model parameters and boundary conditions from the regional MicroFEM model to the MODFLOW model has been streamlined to allow for a relatively quick conversion between the two models. Further consideration will be given to either expand the submodel domain to minimize boundary effects (be able to change pumping rates in just the submodel, rather the both the regional model and submodel) or possibly convert the full MicroFEM model to MODFLOW to negate the need for future model conversions, at				DTSC response: Agencies will provide direction to PG&E in separate letter.

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							the time of the next model update. There would not be a significant difference with the use of general head boundaries verses constant flux boundaries as the constant flux boundaries were adjusted to account for the hydraulic impacts along the submodel boundary. Both GHBs and constant flux boundaries would represent equivalent fluxes into and out of the submodel domain.				
432	FMIT/TRC	Design	Remedial Design	Append B, Sect. 5.1, p. 24, and Append B Att. 1	Batch simulations were performed with the geochemical modeling software PHREEQC using the default PHREEQC Thermodynamic database.	Chromium species are not available in the PHREEQC data base, and thermodynamic properties for chromium species were not shown in Appendix B Attachment 1. What data base was used for the geochemical modeling? Chromium behavior is difficult to predict through geochemical modeling (D.K. Nordstrom, USGS, verbal commun, 2012); therefore, wouldn't selection of the chromium data base be important in order to run the geochemical model after remedy start up, insert new data collected during construction and monitoring, and use the model for rapid geochemical assessment?	Thermodynamic constants for aqueous Cr(III) and Cr(VI) species, which were not available in the default PHREEQC database, were obtained from Morel and Hering (1993); this reference is cited in Section 5.1 of the text. Solubility products for Cr(III) mineral phases were obtained from Sass and Rai (1987); also cited in the text. It is true that chromium behavior is difficult to predict using geochemical modeling alone; accordingly, it is important to validate model predictions with performance data. In this case, historical plume evolution and the results of pilot tests were used to develop the geochemical and solute transport models, as described in the text. These models will continue to be refined after remedy startup as new information is obtained. This may include review and updating of thermodynamic constants as warranted.			It doesn't appear as though chromium was included in the geochemical model at all. The Sass and Rai (1987) and Morel and Hering (1993) citations are outdated and do not provide adequate information (e.g., enthalpy values) to fully conduct geochemical modeling of chromium species. An important project such as Topock should be using the best available chromium thermodynamic data, and these data can be found in Ball and Nordstrom (1998). Suggest that the geochemical modeling should be conducted without fixing pH at 7. Suggest that geochemical modeling should not restrict arsenic to only reduced arsenic-3 species, but should include all of the possible arsenic complexes. Suggest that the geochemical modeling should be re-done with conditions representative of the upland and floodplain. Solid-phase constraints	PG&E Response: One of the references for chromium thermodynamic constants was inadvertently left out of the references list. Specifically, equilibrium constants for aqueous Cr(III) species and the amorphous chromium hydroxide Cr(OH)3 were taken from Rai et al., Journal of Solution Chemistry, 2004. This reference will be added to Appendix B. Other chromium thermodynamic values taken from Morel and Hering, including the Cr(VI) hydrolysis species and the Cr(III) – Cr(VI) redox couple, were compared against those provided in Ball and Nordstrom (1998). Differences in values between the two sources are sufficiently minor as to not affect the overall results. DTSC/DOI response:

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										should be added to the model to simulate interactions between groundwater and the aquifer. Comment unresolved pending development and improvement of the geochemical model using new data collected during installation and construction of the groundwater remedy.	Agencies will provide direction to PG&E in separate letter.
433	Hualapai/TRC	Design	Remedial Design	Append B, Sect. 5.1, p. 24, and Append B Att. 1	Batch simulations were performed with the geochemical modeling software PHREEQC using the default PHREEQC Thermodynamic database.	Chromium species are not available in the PHREEQC data base, and thermodynamic properties for chromium species were not shown in Appendix B Attachment 1. What data base was used for the geochemical modeling? Chromium behavior is difficult to predict through geochemical modeling (D.K. Nordstrom, USGS, verbal commun, 2012); therefore, wouldn't selection of the chromium data base be important in order to run the geochemical model after remedy start up, insert new data collected during construction and monitoring, and use the model for rapid geochemical assessment?	See above			It doesn't appear as though chromium was included in the geochemical model at all. The Sass and Rai (1987) and Morel and Hering (1993) citations are outdated and do not provide adequate information (e.g. enthalpy values) to fully conduct geochemical modeling of chromium species. An important project such as Topock should be using the best available chromium thermodynamic data, and these data can be found in Ball and Nordstrom (1998). Suggest that the geochemical modeling should be conducted without fixing pH at 7. Suggest that geochemical modeling should not restrict arsenic to only reduced arsenic-3 species, but should include all of the possible arsenic complexes. Suggest that the geochemical modeling should be re-done with conditions representative of the upland and floodplain. Solid-phase constraints should be added to the model to simulate interactions between groundwater and the	DTSC response: See RTC #432

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										aquifer. Comment unresolved pending development and improvement of the geochemical model using new data collected during installation and construction of the groundwater remedy.	
434	Cocopah/TRC	Design	Remedial Design	Append B, Sect. 5.1, p. 24, and Append B Att. 1	Batch simulations were performed with the geochemical modeling software PHREEQC using the default PHREEQC Thermodynamic database.	Chromium species are not available in the PHREEQC data base, and thermodynamic properties for chromium species were not shown in Appendix B Attachment 1. What data base was used for the geochemical modeling? Chromium behavior is difficult to predict through geochemical modeling (D.K. Nordstrom, USGS, verbal commun, 2012); therefore, wouldn't selection of the chromium data base be important in order to run the geochemical model after remedy start up, insert new data collected during construction and monitoring, and use the model for rapid geochemical assessment?	See above			It doesn't appear as though chromium was included in the geochemical model at all. The Sass and Rai (1987) and Morel and Hering (1993) citations are outdated and do not provide adequate information (e.g. enthalpy values) to fully conduct geochemical modeling of chromium species. An important project such as Topock should be using the best available chromium thermodynamic data, and these data can be found in Ball and Nordstrom (1998). Suggest that the geochemical modeling should be conducted without fixing pH at 7. Suggest that geochemical modeling should not restrict arsenic to only reduced arsenic-3 species, but should include all of the possible arsenic complexes. Suggest that the geochemical modeling should be re-done with conditions representative of the upland and floodplain. Solid-phase constraints should be added to the model to simulate interactions between groundwater and the aquifer. Comment unresolved pending development and improvement of	DTSC response: See RTC #432

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										the geochemical model using new data collected during installation and construction of the groundwater remedy.	
435	Chemehuevi/ TRC	Design	Remedial Design	Append B, Sect. 5.1, p. 24, and Append B Att. 1	Batch simulations were performed with the geochemical modeling software PHREEQC using the default PHREEQC Thermodynamic database.	Chromium species are not available in the PHREEQC data base, and thermodynamic properties for chromium species were not shown in Appendix B Attachment 1. What data base was used for the geochemical modeling? Chromium behavior is difficult to predict through geochemical modeling (D.K. Nordstrom, USGS, verbal commun, 2012); therefore, wouldn't selection of the chromium data base be important in order to run the geochemical model after remedy start up, insert new data collected during construction and monitoring, and use the model for rapid geochemical assessment?	See above			It doesn't appear as though chromium was included in the geochemical model at all. The Sass and Rai (1987) and Morel and Hering (1993) citations are outdated and do not provide adequate information (e.g. enthalpy values) to fully conduct geochemical modeling of chromium species. An important project such as Topock should be using the best available chromium thermodynamic data, and these data can be found in Ball and Nordstrom (1998). Suggest that the geochemical modeling should be conducted without fixing pH at 7. Suggest that geochemical modeling should not restrict arsenic to only reduced arsenic-3 species, but should include all of the possible arsenic complexes. Suggest that the geochemical modeling should be re-done with conditions representative of the upland and floodplain. Solid-phase constraints should be added to the model to simulate interactions between groundwater and the aquifer. Comment unresolved pending development and improvement of the geochemical model using new data collected during installation and construction of the	DTSC response: See RTC #432

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										groundwater remedy.	
436	DOI-17	Design	GW Modeling	5.2/25	All geochemical speciation and redox calculations were based on published thermodynamic constants	Please indicate if there was a need to correct the constants (e.g, Pitzer) for the high ionic strengths?	PHREEQC uses the Davies equation to make ionic strength corrections, with Davies equation constants included in the thermodynamic database. This approach is largely recognized as valid for ionic strengths as high as 0.7 M, much higher than the ionic strengths of the groundwater modeled at Topock, which exhibits an ionic strength closer to 0.1 M (e.g., Morel and Hering, 1993; reference cited in Appendix B). Accordingly, use of a database with Pitzer model parameters was not necessary. The following text will be added to Section 5.2: "Activity coefficients for charged aqueous species were calculated using the Davies equation, as described in the PHREEQC manual (Parkhurst and Appelo, 1999)."		Accepted.		Resolved.
437	DOI-18	Design	GW Modeling	5.3.3/31	Oxidation of Mn(II) was incorporated in the Topock solute transport model assuming a half-life of 29 days. This value was obtained by starting with a first-order rate coefficient of 0.083 h^{-1}, representing the slowest rate observed by Harvey and Fuller (1998) at the Pinal Creek, Arizona site, and scaling it back by two orders of magnitude to conservatively account for	Please clarify where in the Harvey and Fuller paper the first-order rate coefficient of 0.083 h^{-1} was obtained and why a rate constant of 0.69 h^{-1} was not used. The Harvey and Fulley text on the bottom of page 632 states "considering the fast timescale of laboratory uptake (<6 hours) for all experiments, the range in rescaled rate constants for unpoisoned sediments from Pinal Creek was 0.28-0.69 h^{-1}." A rate constant of 0.69 h^{-1} is more than 8 times slower than 0.083 h^{-1} . A rate constant of 0.083 h^{-1} is a half-life of 8.4 hours, so a half live scaled back by two orders of magnitude would be 840 hours or 35 days; was something else factored in that resulted in the assignment of a half-life of 29 days (rather than 35)? If the rate constant of 0.083 h^{-1} was increased by two orders of magnitude it would be 8.3 h^{-1} and would result in a half-life of 0.34 days. Harvey and Fuller explain that the manganese precipitation is due to the gas exchange of oxygen within the hyporheic zone at the interface between the sediments and surface water as well as biological processes. This oxygenated area is typically thin and the O_2 gas exchange component needs to be integrated into the current conceptual model because it appears to be inconsistent with the reducing rind concept. This could involve a simple explanation that a well oxygenated zone within the streambed separates the reducing rind from the surface water. The manganese rate constants will also be strongly affected by the reduction of dissolved oxygen caused by the injection of the TOC and resulting increase in biological activity. There needs to be additional justification for the assumption that two orders of magnitude adjustment adequately represents the system. The potential impacts of the uncertainty on the model predictions should be discussed in an uncertainty section.	The objective was to use the most conservative (longest half-life) manganese oxidation rate observed in the study. The range on the bottom of page 632 in the Harvey and Fuller reference was based on the laboratory scale results only. Table 3 in Harvey and Fuller cites the averages and ranges in results applicable to the different scales studied. The 0.083 h^-1 rate constant was based on the observed range in hyporheic flow path-based observations, which exhibited a range in the time constant (inverse of the rate constant) of 1 to 12 hours. Thus the rate of 0.083 h^-1 was obtained as the inverse of 12 hours. Note that a rate		Accepted.		Resolved.

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					potential differences in nutrient status and microbial population.		constant of 0.69 h^-1 (half-life = 1 hour) is more than 8 times faster, not slower, than a rate constant of 0.083 h^-1 (half-life = 8.3 hours), and would therefore be a less conservative assumption on oxidation rate. The following text will be added to Section 5.3.3: "This value was obtained by starting with a first-order rate coefficient of 0.083 h^-1, representing the slowest rate observed by Harvey and Fuller (1998) at the Pinal Creek, Arizona site (time constant range of 1 to 12 hours, Table 3 in Harvey and Fuller [1998]), and scaling it back…" The half-life of 29 days appears to have been a typographical error in the text, possibly due to a round-off error (noting that a rate coefficient of 0.1 h^-1 would yield a half-life of 29 days). The text and model will be corrected. The two order of magnitude increase in half life precludes the need for a sensitivity analysis, as it is not a data-based estimate but rather is a deliberate conservative assumption that reaches far beyond estimates in a similar environment. It is correct that manganese oxidation would not occur in the reducing rind, due to the absence of oxygen in this zone. It would also not occur in zones where TOC is being injected – accordingly, manganese oxidation does not occur (and is not modeled) in the IRZ. The text will be modified as follows: "Oxidation of Mn(II) was incorporated in the Topock solute transport model				

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							assuming a half-life of 35 days in zones where sufficient oxygen is present to yield manganese oxidation."				
438	DOI-19	Design	GW Modeling	5.3.3/32	This rate was used to simulate Mn(II) oxidation in the upland, where Mn(II) oxidation was assumed to be active outside of the TOC footprint (TOC less than 0.1 mg/L) of the remedy.	Since the Mn oxidation rate will be very sensitive to the prevailing geochemical conditions and microbial populations please provide some justification (e.g., DO and/or ORP values) for this assumption.	Historical field measurements of dissolved oxygen in groundwater monitoring wells located in the upland OW wells typically range between approximately 5 and 14 mg/L (which includes field probe measurement variability/uncertainty). This range of measured values will be included as justification in Section 5.3.3.		Accepted.		Comment resolved pending DOI review of the final design documents.
439	DOI-20	Design	GW Modeling	5.3.3/33	Therefore, the hyporheic zone PHT3D results demonstrate that the immobilization reaction used in the site-wide solute transport model adequately accounts for the chemical reactions that take place.	The hyporheic zone provides a geochemical environment that is unique to that area of the site where oxygen from the stream is exchanged with the groundwater leading to the precipitation of manganese minerals. Please provide additional explanation of how these modeling results obtained with PHT3D under these conditions now demonstrate that the same conditions are applicable to the entire site. Obviously, if there are areas within the site that are naturally reducing the same assumptions would not apply and manganese may not be oxidized and immobilized.	The text in this section is intended to make the point that oxidation of manganese (when and where it occurs, which is not everywhere) results in a thermodynamically stable and low-solubility mineral phase which is resistant to re-dissolution; therefore, although the site-wide solute transport model does not include any reactions for the precipitated phase, this is not necessary because the geochemical model demonstrates that these phases are stable. This does not preclude the possibility that manganese oxides can be reductively dissolved in some circumstances (this process is included in the model within the IRZ), and it does not suggest that manganese will oxidize and precipitate in the absence of oxygen (it is made clear in other portions of the text that manganese oxidation is only modeled in zones where oxygen is present, including the upland). The text in Section 5.3.3 will be modified as follows: "Therefore, the		Accepted.		Resolved.

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							hyporheic zone PHT3D results demonstrate that the immobilization reaction used in the site-wide solute transport model adequately accounts for the chemical reactions that take place where oxygen is available for manganese oxidation."				
440	DOI-21	Design	GW Modeling	6.2.1/37	Solute mass is exchanged between mobile and immobile portions of the aquifer by diffusion. This conceptualization of solute transport is the dual-domain formulation, and is often referred to as advection-diffusion. There is extensive literature on the dual-domain model (Gillham et al. 1984; Molz et al. 2006; Flach et al. 2004; Harvey and Gorelick 2000; Feehley et al. 2000; Julian et al. 2001; Zheng and Bennet 2002) and it is generally considered the most accurate approach for simulating solute transport.	Please explain why the dual domain model was assumed when as noted in ARCADIS (2009, p. 18) the tracer test data did not indicate dual porosity behavior: *Note that the dual-domain mass transfer model of Zheng and Wang (Zheng and Wang, 1999) was not used in the solute transport model because minimal tailing was observed in the actual tracer breakthrough curves and that a dual-domain approach to solute transport was not necessary to closely simulate tracer behavior.* If there is significant dual phase behavior the tracer profile should be more log-normal as opposed to Gaussian. ARCADIS, 2009. Upland Reductive Zone In-Situ Pilot Test Final Completion Report.	The dual-domain model was utilized as a conservative measure to account for the likely interaction of the mobile and immobile fractions in the simulation of this heterogeneous aquifer. While the dual porosity was not clearly indicated by the tracer testing, for the simulation of the full aquifer it was deemed appropriate to utilize the more conservative dual-domain approach. The mass transfer coefficient and mobile/immobile porosities utilized in the final dual domain model did not result in a significant dual phase behavior.		Accepted.		Resolved.
441	DOI-22	Design	GW Modeling	6.2.1/37	The mechanics of deposition and consolidation of unconsolidated materials result in aquifer soils at the Site exhibiting a total porosity of	There really needs to be a basis for the estimate of 35% percent total porosity. Since the mobile porosity is 12% the immobile porosity is 23% (which checks out with the *.btn file). Most of the contaminant mass will be in the immobile porosity and remediation times are typically very sensitive to the immobile porosity. Furthermore, it's difficult to see how the local variability would not have an impact on overall results. As stated above the assumptions regarding immobile porosity and the transfer coefficient will have a significant impact on predicted remediation times. It also seems unusual that the mobile and immobile porosities were not included in the sensitivity analysis since they are both fairly uncertain and the model results will be very sensitive to the values assumed. Please provide a basis for the value of 23% for the immobile porosity. Please provide the rationale for not including the porosities in the sensitivity analysis.	The mobile, immobile, and total porosity values used in the solute transport modeling are consistent with the range of values presented in Attachment A of CH2M Hill 2010 - Methods of Estimating Pore Volume Flushing Efficiency Used in Calculating Mass		Accepted.		Comment resolved pending DOI review of the final design documents and the sensitivity analysis.

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					approximately 35%. Local variability will not have an impact on overall results, and 35% is a reliable estimate for the total porosity of modeled layers 1 through 4.		Removal Rates for CMS/FS Alternatives. This Attachment indicates a range in immobile porosities of 22% to 28%, and a range in total porosities of 29% to 40%. The total porosity range is supported by porosity measurements made on 20 site samples as part of the original draft RFI (E&E, 2004), which ranged between 26.8% and 42.7%, with an average of 35.5%. As the computed mobile porosity from ARCADIS, 2008 support a 12% mobile porosity, an immobile porosity of 23% and a total porosity of 35% were selected as average values for the solute transport modeling exercise. The total porosity of 35% is also consistent with porosity values recorded for similar alluvial and fluvial aquifer materials (Fetter, 2001; Payne et al., 2008). The preceding text and references will be added to Section 6.2.1 to further justify porosity values used in the solute transport modeling. Local variations in porosity due to aquifer heterogeneity are not expected to have a significant impact on remedy performance as the average values are more representative of the entire Site in evaluating remedy performance. In order to evaluate the potential impact of immobile and mobile porosity values on the simulation of the remedy, a sensitivity analysis will be conducted on a representative range of porosities.				

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							Reference: Ecology and Environment (E&E). 2004. Draft RCRA Facility Investigation (RFI) Report, Bat Cave Wash Area, Pacific Gas and Electric Company's Topock Compressor Station. February.				
442	FMIT/TRC	Non-design	GW Modeling	Append B Sect. 6.2 P. 37	"6.2 Solute Transport Parameters"	Why weren't more realistic values developed for transport parameters by calibrating the flow and solute transport model against Quarterly IM3 water level and concentration changes (i.e., instead of from publications)? Is there any reason this couldn't be done now, prior to finalization of design/operation/installation/testing etc.? These data seem to be the best available information on how the model (flow/fate/transport) performs in a critical area.	Solute transport parameters were developed using a combination of geochemical modeling based on Site data, observations made during in-situ pilot testing (ISPT), historical plume movement, and literature. The ISPT data are comparable to the proposed remedial strategy, and recent IM-3 data, with respect to overall groundwater flow and Cr(VI) plume movement, were considered and appear to be consistent with the simulated groundwater flow and solute transport parameters utilized. Flow and transport model calibrations will also be conducted during the future model updates.			The last statement of PG&Es comment misses the point . Conducting this analysis BEFORE completion of the 90%BOD is so that all stakeholders can be guaranteed, to the extent possible, that all data have been used to calibrate the model in a key area. The IM-3 data represent years of good quality data in the most contaminated part of the site (vs. the ISPT location). The IM-3 data cover a much larger geographic area and are available for much longer (i.e., 10 years), which might require different assumptions about fate/transport parameters (i.e., floodplain vs. upland etc.), both of which are influenced by IM-3 data. We strongly recommend that IM-3 data are used at a minimum to validate current assumptions used in the fate/ transport model, where relevant (i.e., obviously one can't evaluate Mn and As w/out TOC, which IM-3 doesn't include.	DTSC response: Agencies will provide direction to PG&E in separate letter.
443	Hualapai/TRC	Non-design	GW Modeling	Append B Sect. 6.2 P. 37	"6.2 Solute Transport Parameters"	Why weren't more realistic values developed for transport parameters by calibrating the flow and solute transport model against Quarterly IM3 water level and concentration changes (i.e., instead of from publications)? Is there any reason this couldn't be done now, prior to finalization of design/operation/installation/testing etc.? These data seem to be the best available information on how the model (flow/fate/transport) performs in a critical area.	See above			The last statement of PG&Es comment misses the point . Conducting this analysis BEFORE completion of the 90%BOD is so that all stakeholders can be guaranteed, to the extent possible, that all data have been used to calibrate the model in a	DTSC response: See RTC #442

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										key area. The IM-3 data represent years of good quality data in the most contaminated part of the site (vs. the ISPT location). The IM-3 data cover a much larger geographic area and are available for much longer (i.e., 10 years), which might require different assumptions about fate/transport parameters (i.e., floodplain vs. upland etc.), both of which are influenced by IM-3 data. We strongly recommend that IM-3 data are used at a minimum to validate current assumptions used in the fate/transport model, where relevant (i.e., obviously one can't evaluate Mn and As w/out TOC, which IM-3 doesn't include.	
444	Cocopah/TRC	Non-design	GW Modeling	Append B Sect. 6.2 P. 37	"6.2 Solute Transport Parameters"	Why weren't more realistic values developed for transport parameters by calibrating the flow and solute transport model against Quarterly IM3 water level and concentration changes (i.e., instead of from publications)? Is there any reason this couldn't be done now, prior to finalization of design/operation/installation/testing etc.? These data seem to be the best available information on how the model (flow/fate/transport) performs in a critical area.	See above			The last statement of PG&Es comment misses the point . Conducting this analysis BEFORE completion of the 90%BOD is so that all stakeholders can be guaranteed, to the extent possible, that all data have been used to calibrate the model in a key area. The IM-3 data represent years of good quality data in the most contaminated part of the site (vs. the ISPT location). The IM-3 data cover a much larger geographic area and are available for much longer (i.e., 10 years), which might require different assumptions about fate/transport parameters (i.e., floodplain vs. upland etc.), both of which are influenced by IM-3 data. We strongly recommend that IM-3 data are used at a	DTSC response: See RTC #442

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										minimum to validate current assumptions used in the fate/ transport model, where relevant (i.e., obviously one can't evaluate Mn and As w/out TOC, which IM-3 doesn't include.	
445	Chemehuevi/ TRC	Non-design	GW Modeling	Append B Sect. 6.2 P. 37	"6.2 Solute Transport Parameters"	Why weren't more realistic values developed for transport parameters by calibrating the flow and solute transport model against Quarterly IM3 water level and concentration changes (i.e., instead of from publications)? Is there any reason this couldn't be done now, prior to finalization of design/operation/installation/testing etc.? These data seem to be the best available information on how the model (flow/fate/transport) performs in a critical area.	See above			The last statement of PG&Es comment misses the point . Conducting this analysis BEFORE completion of the 90%BOD is so that all stakeholders can be guaranteed, to the extent possible, that all data have been used to calibrate the model in a key area. The IM-3 data represent years of good quality data in the most contaminated part of the site (vs. the ISPT location). The IM-3 data cover a much larger geographic area and are available for much longer (i.e., 10 years), which might require different assumptions about fate/transport parameters (i.e., floodplain vs. upland etc.), both of which are influenced by IM-3 data. We strongly recommend that IM-3 data are used at a minimum to validate current assumptions used in the fate/transport model, where relevant (i.e., obviously one can't evaluate Mn and As w/out TOC, which IM-3 doesn't include.	DTSC response: See RTC #442
446	DOI-23	Design	GW Modeling	6.2.3/38	The text states "A Kd value of 0.05 L/kg in the aquifer results in a retardation factor of approximately 1.25 for the Cr(VI) plume in the solute transport model."	Please revise the Retardation Factor (RF) calculation and discussion. A kd of 0.05, bulk density of 1.73 (p.30) and a mobile porosity of 12 percent will result in a RF of 1.72 (as opposed to 1.25). It appears that the total porosity (35%) was used for the RF calculation; however, based on a review of the model input files it appears that RF's were calculated for both the mobile and immobile domains. Since the mobile porosity is used to calculate advective transport rates rather than the total porosity. Since MT3D allows a number of options with respect to the treatment of sorption it would be worthwhile to present how it was actually assigned in the model.	In a dual-domain model, MT3DMS automatically fractionates the bulk density into mobile and immobile portions based on the mobile and immobile porosities to ensure a consistent retardation factor in both domains. In order to maintain the same retardation factor in		Accepted.		Resolved.

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							mobile and immobile domains, the basis for the retardation factor should be total porosity. Using total porosity in the calculation results in a retardation factor of 1.25. To check the MT3DMS calculation print flag (IFMTRF flag) located in the Basic Transport file (BTN) was enabled. This flags prints the model computed retardation factor in the MT3DMS output file and a value of 1.25 was reported, which indicates that the retardation factor will be applied consistently in both domains.				
447	DOI-24	Design	GW Modeling	6.2.3/38	The text states "The presence of background Cr(VI) concentrations associated with the naturally occurring mineralogy suggests nominal adsorption (low Kd value) is representative of the aquifer. This assessment is consistent with the literature, which identifies a wide range of Kd values (USEPA 1999) for naturally occurring Cr(VI) in aquifer soils with a normal pH range."	The amount of chromium mass that is initialized in the model as well as the transport velocities and remediation times will be very sensitive to the Kd value. The text indicates that the Kd values are thought to be low due to the background concentrations but goes on to conclude that this is consistent with a wide range of values. Please explain how low Kd values are consistent with a wide range? It is also unclear how high background concentrations by themselves indicate low Kd values. Since the Kd is simply proportionality constant, high background concentrations could also result from high Kd values if the sorbed concentrations of chromium are high enough. Please clarify the text. Although the actual Kd value is not predicted by the solubility modeling described in Section 5 the approach should integrate the information gained from the solubility modeling into the selection of the Kd values.	The text will be clarified to state that the low K_d value falls within the range of reported K_d values. A laboratory study on aerobic core samples from the Site (CH2M Hill, 2005, *Summary of Results—Aerobic Zone Hexavalent Chromium Core Testing*) indicated the range in Kd values from two aerobic core samples collected from the flood plain varied between 0.01 and 0.09 L/kg. This study therefore supports the value of 0.05 L/kg utilized in the baseline hexavalent chromium modeling. A reference to this technical memo will be added to the text. Additionally, the current Cr(VI) plume distribution and the relatively low groundwater flow velocities support the assumption that minimal sorption of Cr(VI) is occurring at the Site. If K_d values for Cr(VI) were high, the current plume footprint would be much more limited in spatial extent. For comparative purposes, an elevated K_d value was assessed in a sensitivity analysis to		Accepted.		Comment resolved pending DOI review of the final design documents.

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							demonstrate potential impact on remedial timeframe and plume distribution. To the extent possible, the Cr(VI) K_d value used will be checked for consistency against other geochemical model parameters developed in Section 5.				
448	DOI-25	Design	GW Modeling	6.2.3/38	The text states "The Cr(VI) Kd value was further adjusted in the bedrock to better simulate the movement of Cr(VI) in the fractured bedrock.	The text indicates that the Kd was fixed to obtain a Rf of 1.25 rather than adjusted to better simulate the movement of Cr(VI). So was it the porosity (rather than the Kd) that was adjusted to better simulate the movement in the fractured bedrock? Since the RF's are calculated separately in MT3D for the mobile and immobile porosity—there really is not a RF of 1.25. So please describe how the matrix and mobile porosities in conjunction with the Kd's are assigned in the fractured bedrock and overlying aquifers.	Porosity was reduced in the bedrock first to better represent the fracture flow. If the K_d value utilized in the alluvial aquifer were held constant in the bedrock, a significantly higher retardation factor would result in the bedrock as the bulk density increased and the total porosity decreased in the computation. This would be inconsistent with respect to the current spatial extent of Cr(VI) in the bedrock. Therefore, the K_d value in bedrock was reduced to yield an equivalent R_f of 1.25 as simulated in the aquifer. This lower K_d value is also supported by the limited fraction of organic carbon in bedrock fractures. As stated in the RTC #446 DOI-23, MT3DMS utilizes total porosity in the calculation of the R_f.		Accepted.		Resolved.
449	DOI-26	Design	GW Modeling	6.2.3/38	The bedrock was simulated with a total porosity of 2% so the Kd value in bedrock was reduced to 0.0029 L/kg to yield an equivalent Rf as calculated in the aquifer to establish a uniform Rf value of 1.25 throughout the entire submodel	For this Kd assumption to be valid the bedrock should have similar geochemical conditions (e.g., ionic strengths, cations, anions, pH, Eh and total organic carbon) to the overlying units. Please provide justification for this Kd assumption.	By reducing the K_d in the bedrock, the assumption is made that geochemical conditions are not similar in the bedrock; however, a similar resultant nominal R_f value of 1.25 was utilized to represent the current Cr(VI) plume distribution in bedrock.		Accepted.		Resolved.

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					domain.						
450	DOI-27	Design	GW Modeling	6.2.5/39	The distribution of the Cr(VI) for model layers 1 through 4 are shown on Figures 6.2-1 through 6.2-4.	Please indicate whether any Cr(VI) was initialized in Layer 5.	Cr(VI) was not initialized in Layer 5. This statement will be added to Section 6.2.5.		Resolved		Resolved.
451	DOI-28	Design	GW Modeling	6.2.7/41	Further, pH buffering to circumneutral values will ensure that most of the inorganic carbon generated will be present as bicarbonate rather than dissolved CO2.	Please clarify whether this is due to natural buffering of the system or whether a buffer will be added to the injectant.	The text will be reworded as follows: "Further, pH buffering to circumneutral values by the aquifer solids will ensure that most of the inorganic carbon generated will be present as bicarbonate rather than dissolved CO2."		Resolved		Resolved.
452	DOI-29	Design	GW Modeling	6.2.7/41	Formation of H2(g) and H2S will be limited by controlling TOC concentrations to limit byproduct generation. Formation of these gases (as well as N2 formation) was not an issue during the pilot testing conducted in the floodplain.	At the planned TOC loading rates it would seem that the generation of methane would be much more likely than H2S and should be mentioned.	The text will be reworded as follows: "Formation of H2(g), H2S, and methane will be limited by controlling TOC concentrations…"		Resolved		Resolved.
453	FMIT/TRC	Non-design	GW Modeling	Append B 6.3/p42	"The regional groundwater flow model was calibrated against (a) long term average groundwater levels, (b) average monthly floodplain levels responding to fluctuating river levels, (c) short- term responses to pump testing events, and (d) plume development	After system startup and operation, will future calibration of the model(s) involve calibrating against data from dewatered conditions and these previous (a to d) calibration data to ensure that the model is properly calibrated? Will new concentration data trends also be used to calibrate the fate/transport model for the first time – it has not been calibrated to date (i.e., to IM-3 Quarterly Monitoring data). An approach/methodology to calibration (including use of PEST) has not been presented in the 90%BOD reports, but is strongly recommended to avoid ambiguity/confusion, especially when critical decisions must be made in a short time period, or proper justification is required for stakeholders when proposing changes to the present proposed design/operation of the system.	Future groundwater flow model calibrations will utilize recent data sets along with historical calibration data sets to further validate the groundwater flow model. Upon completion of the calibration of the groundwater flow model, the solute transport model will be calibrated against recent concentration data and observed trends, in accordance with the schedule in Appendix B Section 12. An additional paragraph			The Tribe requests that the 90% BOD discussion on future calibration groundwater flow (and fate/transport) models be presented in more detail for all stakeholders. For example, what are calibration targets, tolerance, use of PEST, etc.?	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					over time as presented in the Groundwater Model Update (CH2M Hill, 2005b)."		will be added to Appendix B Section 12 to discuss the intended future use of the model including updating remediation time frame estimates, supporting capture zone analyses, and analyzing potential remedy design operation changes.				
454	Hualapai/TRC	Non-design	GW Modeling	Append B 6.3/p42	"The regional groundwater flow model was calibrated against (a) long term average groundwater levels, (b) average monthly floodplain levels responding to fluctuating river levels, (c) short- term responses to pump testing events, and (d) plume development over time as presented in the Groundwater Model Update (CH2M Hill, 2005b)."	After system startup and operation, will future calibration of the model(s) involve calibrating against data from dewatered conditions and these previous (a to d) calibration data to ensure that the model is properly calibrated? Will new concentration data trends also be used to calibrate the fate/transport model for the first time – it has not been calibrated to date (i.e., to IM-3 Quarterly Monitoring data). An approach/methodology to calibration (including use of PEST) has not been presented in the 90%BOD reports, but is strongly recommended to avoid ambiguity/confusion, especially when critical decisions must be made in a short time period, or proper justification is required for stakeholders when proposing changes to the present proposed design/operation of the system.	See above			Hualapai request that the 90%BOD discussion on future calibration groundwater flow (and fate/transport) models be presented in more detail for all stakeholders. For example, what are calibration targets, tolerance, use of PEST etc.?	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
455	Cocopah/TRC	Non-design	GW Modeling	Append B 6.3/p42	"The regional groundwater flow model was calibrated against (a) long term average groundwater levels, (b) average monthly floodplain levels responding to fluctuating river levels, (c) short- term responses to pump testing events, and (d) plume development over time as presented in	After system startup and operation, will future calibration of the model(s) involve calibrating against data from dewatered conditions and these previous (a to d) calibration data to ensure that the model is properly calibrated? Will new concentration data trends also be used to calibrate the fate/transport model for the first time – it has not been calibrated to date (i.e., to IM-3 Quarterly Monitoring data). An approach/methodology to calibration (including use of PEST) has not been presented in the 90%BOD reports, but is strongly recommended to avoid ambiguity/confusion, especially when critical decisions must be made in a short time period, or proper justification is required for stakeholders when proposing changes to the present proposed design/operation of the system.	See above			Tribes request that the 90% BOD discussion on future calibration groundwater flow (and fate/ transport) models be presented in more detail for all stakeholders. For example, what are calibration targets, tolerance, use of PEST etc.?	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					the Groundwater Model Update (CH2M Hill, 2005b)."						
456	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 6.3/p42	"The regional groundwater flow model was calibrated against (a) long term average groundwater levels, (b) average monthly floodplain levels responding to fluctuating river levels, (c) short- term responses to pump testing events, and (d) plume development over time as presented in the Groundwater Model Update (CH2M Hill, 2005b)."	After system startup and operation, will future calibration of the model(s) involve calibrating against data from dewatered conditions and these previous (a to d) calibration data to ensure that the model is properly calibrated? Will new concentration data trends also be used to calibrate the fate/transport model for the first time – it has not been calibrated to date (i.e., to IM-3 Quarterly Monitoring data). An approach/methodology to calibration (including use of PEST) has not been presented in the 90%BOD reports, but is strongly recommended to avoid ambiguity/confusion, especially when critical decisions must be made in a short time period, or proper justification is required for stakeholders when proposing changes to the present proposed design/operation of the system.	See above			Tribes request that the 90% BOD discussion on future calibration groundwater flow (and fate/ transport) models be presented in more detail for all stakeholders. For example, what are calibration targets, tolerance, use of PEST etc.?	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
457	FMIT/TRC	Non-design	GW Modeling	Append B 6.5 p. 52	"Figures 6.5-6 through 6.5-8 depict the two potential groundwater conditions that exist with the proposed remedial design. One frame of each figure depicts the contours with the NTH IRZ under operating conditions for a 6-month period, while the second image shows conditions with the NTH IRZ turned off for an 18-month period."	Could the expected simulated change in head be provided during IRZ operation and when it is off? This helps the tribal representatives know what the expected simulated changes in head might be. Could the best estimates of maximum head change (increase/decrease) at each injection/extraction and monitoring well also be provided to the Tribes (and by screen interval/depth). It will be instructive for Tribes to fully understand when 'significant deviations' might occur - as this potentially triggers an internal evaluation (yet to be adequately defined) by PG&E/consultants to decide if this warrants a model update, re-calibration to available information, and simulation of future scenarios to assess if current design/operations continues to meet RAOs/minimum performance threshold criteria.	A new figure will be generated showing the spatial difference in drawdown and mounding between the NTH IRZ ON and NTH IRZ OFF periods. The simulated head changes at NTH IRZ wells will also be presented. Text referencing "significant deviations" will be removed and the model update procedure schedule presented in Appendix B Section 12 will be utilized.			The Tribe also requests that simulated heads at wells also be corrected for model grid cell size and head losses at the well.	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
458	Hualapai/TRC	Non-design	GW Modeling	Append B 6.5 p. 52	"Figures 6.5-6 through 6.5-8 depict the two	Could the expected simulated change in head be provided during IRZ operation and when it is off? This helps the tribal representatives know what the expected simulated changes in head might be. Could the best estimates of maximum head change (increase/decrease) at each	See above			Hualapai also request that simulated heads at wells also be corrected	DTSC/DOI response: Agencies will provide direction to PG&E in

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					potential groundwater conditions that exist with the proposed remedial design. One frame of each figure depicts the contours with the NTH IRZ under operating conditions for a 6-month period, while the second image shows conditions with the NTH IRZ turned off for an 18-month period.”	injection/extraction and monitoring well also be provided to the Tribes (and by screen interval/depth). It will be instructive for Tribes to fully understand when ‘significant deviations’ might occur - as this potentially triggers an internal evaluation (yet to be adequately defined) by PG&E/consultants to decide if this warrants a model update, re-calibration to available information, and simulation of future scenarios to assess if current design/operations continues to meet RAOs/minimum performance threshold criteria.				for model grid cell size and head losses at the well.	a separate letter.
459	Cocopah/TRC	Non-design	GW Modeling	Append B 6.5 p. 52	“Figures 6.5-6 through 6.5-8 depict the two potential groundwater conditions that exist with the proposed remedial design. One frame of each figure depicts the contours with the NTH IRZ under operating conditions for a 6-month period, while the second image shows conditions with the NTH IRZ turned off for an 18-month period.”	Could the expected simulated change in head be provided during IRZ operation and when it is off? This helps the tribal representatives know what the expected simulated changes in head might be. Could the best estimates of maximum head change (increase/decrease) at each injection/extraction and monitoring well also be provided to the Tribes (and by screen interval/depth). It will be instructive for Tribes to fully understand when ‘significant deviations’ might occur - as this potentially triggers an internal evaluation (yet to be adequately defined) by PG&E/consultants to decide if this warrants a model update, re-calibration to available information, and simulation of future scenarios to assess if current design/operations continues to meet RAOs/minimum performance threshold criteria.	See above			Tribes also request that simulated heads at wells also be corrected for model grid cell size and head losses at the well.	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
460	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 6.5 p. 52	“Figures 6.5-6 through 6.5-8 depict the two potential groundwater conditions that exist with the proposed remedial design. One frame of each figure depicts the contours	Could the expected simulated change in head be provided during IRZ operation and when it is off? This helps the tribal representatives know what the expected simulated changes in head might be. Could the best estimates of maximum head change (increase/decrease) at each injection/extraction and monitoring well also be provided to the Tribes (and by screen interval/depth). It will be instructive for Tribes to fully understand when ‘significant deviations’ might occur - as this potentially triggers an internal evaluation (yet to be adequately defined) by PG&E/consultants to decide if this warrants a model update, re-calibration to available information, and simulation of future scenarios to assess if current design/operations continues to meet RAOs/minimum performance threshold criteria.	See above			Tribes also request that simulated heads at wells also be corrected for model grid cell size and head losses at the well.	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					with the NTH IRZ under operating conditions for a 6-month period, while the second image shows conditions with the NTH IRZ turned off for an 18-month period.”						
461	FMIT/TRC	Design	GW Modeling	Figs. 6.5-13 to 6.5-20	Injections at FW-1 and IRL wells	Previous model presentations (e.g. Groundwater EIR) showed that the water-table would rise about 28 feet near injection well FW-1, and the current model shows lower water table rises. Cobble layers within the lithology have been noted in drilling logs from the FW-1 injection area (RFI-RI v. 2 App). Do these cobble layers outcrop in the arroyos to the north? If the water table rises due to FW and IRL injections, these cobble layers could transmit injected water to the surface, appearing as unnatural springs in the arroyos. Have threshold water levels been established for monitoring wells? Has a monitoring program been considered for induced seeps and springs?	In the area of FW-1, the vadose zone is approximately 100 ft thick Mounding will be greatest in the immediate vicinity of the injection well and then reduce rapidly as distance from the injection point increases due to the overall thickness of the alluvial aquifer in this area (>350 ft). Even with mounding up to 28 ft, the extent of the hydraulic mound would be limited and there is still substantial vadose zone above the water table. For these reasons it is highly unlikely that water will transmit along potential continuous cobble layers and appear as springs in the arroyos. Therefore threshold water levels for monitoring wells and a monitoring program for induced seeps and springs is not needed.			Reviewer did not answer the question: “Do these cobble layers outcrop in arroyos to the north of FW and IRL wells?” Maintaining the integrity of the maze area is of the utmost importance. For example, when the remedy is operating and nobody is monitoring, a seep appears unnoticed, and the seep grows like a leaking dam, which could cause great destruction to the cultural resources of the area, especially if such a seep goes unnoticed for long periods of time. Volunteers have offered to monitor for unnatural springs in the project area; however, reliance on volunteers for a 30-50 year project does not provide security that a potential disaster could be averted. Comment unresolved.	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
462	Hualapai/TRC	Design	GW Modeling	Figs. 6.5-13 to 6.5-20	Injections at FW-1 and IRL wells	Previous model presentations (e.g. Groundwater EIR) showed that the water-table would rise about 28 feet near injection well FW-1, and the current model shows lower water table rises. Cobble layers within the lithology have been noted in drilling logs from the FW-1 injection area (RFI-RI v. 2 App). Do these cobble layers outcrop in the arroyos to the north? If the water table rises due to FW and IRL injections, these cobble layers could transmit injected water to the surface, appearing as unnatural springs in the arroyos. Have threshold water levels been established for monitoring wells? Has a monitoring program been considered for induced seeps and springs?	See above			Reviewer did not answer the question: “Do these cobble layers outcrop in arroyos to the north of FW and IRL wells?” Maintaining the integrity of the maze area is of the utmost importance. For example, when the remedy is operating and nobody is	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										monitoring, a seep appears unnoticed, and the seep grows like a leaking dam, which could cause great destruction to the cultural resources of the area, especially if such a seep goes unnoticed for long periods of time. Volunteers have offered to monitor for unnatural springs in the project area; however, reliance on volunteers for a 30-50 year project does not provide security that a potential disaster could be averted. Comment unresolved.	
463	Cocopah/TRC	Design	GW Modeling	Figs. 6.5-13 to 6.5-20	Injections at FW-1 and IRL wells	Previous model presentations (e.g. Groundwater EIR) showed that the water-table would rise about 28 feet near injection well FW-1, and the current model shows lower water table rises. Cobble layers within the lithology have been noted in drilling logs from the FW-1 injection area (RFI-RI v. 2 App). Do these cobble layers outcrop in the arroyos to the north? If the water table rises due to FW and IRL injections, these cobble layers could transmit injected water to the surface, appearing as unnatural springs in the arroyos. Have threshold water levels been established for monitoring wells? Has a monitoring program been considered for induced seeps and springs?	See above			Reviewer did not answer the question: "Do these cobble layers outcrop in arroyos to the north of FW and IRL wells?" Maintaining the integrity of the maze area is of the utmost importance. For example, when the remedy is operating and nobody is monitoring, a seep appears unnoticed, and the seep grows like a leaking dam, which could cause great destruction to the cultural resources of the area, especially if such a seep goes unnoticed for long periods of time. Volunteers have offered to monitor for unnatural springs in the project area; however, reliance on volunteers for a 30-50 year project does not provide security that a potential disaster could be averted. Comment unresolved.	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
464	Chemehuevi/ TRC	Design	GW Modeling	Figs. 6.5-13 to 6.5-20	Injections at FW-1 and IRL wells	Previous model presentations (e.g. Groundwater EIR) showed that the water-table would rise about 28 feet near injection well FW-1, and the current model shows lower water table rises. Cobble layers within the lithology have been noted in drilling logs from the FW-1 injection area (RFI-RI v. 2 App). Do these cobble layers outcrop in the arroyos to the north? If the water table rises due to FW and IRL injections, these cobble layers could transmit injected water to the surface,	See above			Reviewer did not answer the question: "Do these cobble layers outcrop in arroyos to the north of FW and IRL	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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						appearing as unnatural springs in the arroyos. Have threshold water levels been established for monitoring wells? Has a monitoring program been considered for induced seeps and springs?				wells?" Maintaining the integrity of the maze area is of great importance. For example, when the remedy is operating and nobody is monitoring, a seep appears unnoticed, and the seep grows like a leaking dam, which could cause great destruction to the cultural resources of the area, especially if such a seep goes unnoticed for long periods of time. Volunteers have offered to monitor for unnatural springs in the project area; however, reliance on volunteers for a 30-50 year project does not provide security that a potential disaster could be averted. Comment unresolved.	
465	FMIT/TRC	Non-design	GW Modeling	Append B 6.6 p. 54	"While the model will be updated with new data where applicable as described in Section 12, general initial design considerations can be made relative to design operation if significant deviations in parameters occur."	This is confusing. The meaning of "significant deviations" needs to be made much clearer and based on very specific quantitative performance metrics to avoid ambiguity and confusion. This can only be done with an updated/re-calibrated model. Whether parameter deviations are significant can ONLY be determined using an updated/re-calibrated model and considered 'significant' ONLY if they change system performance to RAOs/OPS by some threshold, yet to be specified. Greater details of how/when all models are updated and re-calibrated should be presented here, given the importance to future decisions on changes to the design/operation that will have to rely heavily on the models.	See response to comment #76. The term "significant differences" will be removed and the model update schedule will be followed as described in Appendix B Section 12. Material changes to the model including update and recalibrations will be noted in the corresponding quarterly report, and presented in detail in the annual report.			The Tribe requests that PG&E consultants keep track of not only all 'Material changes' made to the model(s), which should be defined better here, but should also track adjustments to all 'knobs' that are changed to the currently planned design (i.e., new wells) and operations (TOC injection rates, durations, volumes injected, increases and decreases in injection and extraction flow rates, timing and duration of all stoppages of injection/ extraction of all wells etc.) so that when different models (,i.e., MicroFEM, Modflow, MT3D, Phreeqc, PEST etc.) are updated and re-calibrated to available time-varying heads, 3-d gradients and concentrations, the models can actually be	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										expected to reproduce all of the system flows and fate/transport in a continually changing/ adjusted system. Each 'adjustment' will induce a change that simply translates and adds to other system adjustments, and the Tribes feel that PG&E consultants could easily get confused with which adjustment goes with which change in system response, possibly causing incorrect 'field-based' adjustments that impact overall system performance towards meeting RAOs.	
466	Hualapai/TRC	Non-design	GW Modeling	Append B 6.6 p. 54	"While the model will be updated with new data where applicable as described in Section 12, general initial design considerations can be made relative to design operation if significant deviations in parameters occur."	This is confusing. The meaning of "significant deviations" needs to be made much clearer and based on very specific quantitative performance metrics to avoid ambiguity and confusion. This can only be done with an updated/re-calibrated model. Whether parameter deviations are significant can ONLY be determined using an updated/re-calibrated model and considered 'significant' ONLY if they change system performance to RAOs/OPS by some threshold, yet to be specified. Greater details of how/when all models are updated and re-calibrated should be presented here, given the importance to future decisions on changes to the design/operation that will have to rely heavily on the models.	See above			Hualapai request that PG&E consultants keep track of not only all 'Material changes' made to the model(s), which should be defined better here, but should also track adjustments to all 'knobs' that are changed to the currently planned design (i.e., new wells) and operations (TOC injection rates, durations, volumes injected, increases and decreases in injection and extraction flow rates, timing and duration of all stoppages of injection/extraction of all wells etc.) so that when different models (i.e., MicroFEM, Modflow, MT3D, Phreeqc, PEST etc.) are updated and re-calibrated to available time-varying heads, 3-d gradients and concentrations, the models can actually be expected to reproduce all of the system flows and fate/transport in a continually changing/adjusted	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										system. Each 'adjustment' will induce a change that simply translates and adds to other system adjustments, and the Tribes feel that PG&E consultants could easily get confused with which adjustment goes with which change in system response, possibly causing incorrect 'field-based' adjustments that impact overall system performance towards meeting RAOs.	
467	Cocopah/TRC	Non-design	GW Modeling	Append B 6.6 p. 54	"While the model will be updated with new data where applicable as described in Section 12, general initial design considerations can be made relative to design operation if significant deviations in parameters occur."	This is confusing. The meaning of "significant deviations" needs to be made much clearer and based on very specific quantitative performance metrics to avoid ambiguity and confusion. This can only be done with an updated/re-calibrated model. Whether parameter deviations are significant can ONLY be determined using an updated/re-calibrated model and considered 'significant' ONLY if they change system performance to RAOs/OPS by some threshold, yet to be specified. Greater details of how/when all models are updated and re-calibrated should be presented here, given the importance to future decisions on changes to the design/operation that will have to rely heavily on the models.	See above			Tribes request that PG&E consultants keep track of not only all 'Material changes' made to the model(s), which should be defined better here, but should also track adjustments to all 'knobs' that are changed to the currently planned design (i.e., new wells) and operations (TOC injection rates, durations, volumes injected, increases and decreases in injection and extraction flow rates, timing and duration of all stoppages of injection/extraction of all wells etc.) so that when different models (i.e., MicroFEM, Modflow, MT3D, Phreeqc, PEST etc.) are updated and re-calibrated to available time-varying heads, 3-d gradients and concentrations, the models can actually be expected to reproduce all of the system flows and fate/transport in a continually changing/adjusted system. Each 'adjustment' will induce a change that simply translates and adds to other system	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										adjustments, and the Tribes feel that PG&E consultants could easily get confused with which adjustment goes with which change in system response, possibly causing incorrect 'field-based' adjustments that impact overall system performance towards meeting RAOs.	
468	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 6.6 p. 54	"While the model will be updated with new data where applicable as described in Section 12, general initial design considerations can be made relative to design operation if significant deviations in parameters occur."	This is confusing. The meaning of "significant deviations" needs to be made much clearer and based on very specific quantitative performance metrics to avoid ambiguity and confusion. This can only be done with an updated/re-calibrated model. Whether parameter deviations are significant can ONLY be determined using an updated/re-calibrated model and considered 'significant' ONLY if they change system performance to RAOs/OPS by some threshold, yet to be specified. Greater details of how/when all models are updated and re-calibrated should be presented here, given the importance to future decisions on changes to the design/operation that will have to rely heavily on the models.	See above			Tribes request that PG&E consultants keep track of not only all 'Material changes' made to the model(s), which should be defined better here, but should also track adjustments to all 'knobs' that are changed to the currently planned design (i.e., new wells) and operations (TOC injection rates, durations, volumes injected, increases and decreases in injection and extraction flow rates, timing and duration of all stoppages of injection/extraction of all wells etc.) so that when different models (i.e., MicroFEM, Modflow, MT3D, Phreeqc, PEST etc.) are updated and re-calibrated to available time-varying heads, 3-d gradients and concentrations, the models can actually be expected to reproduce all of the system flows and fate/transport in a continually changing/adjusted system. Each 'adjustment' will induce a change that simply translates and adds to other system adjustments, and the Tribes feel that PG&E consultants could easily get confused with which adjustment goes	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										with which change in system response, possibly causing incorrect 'field-based' adjustments that impact overall system performance towards meeting RAOs.	
469	FMIT/TRC RTC, 60% #382	Non-design	GW Modeling	Append B 6.3	(orig comment #382 response)....” *An additional paragraph will be added to list the parameters that were not adjusted during this solute transport model sensitivity analysis.”*	This additional description does not seem to have been included in the 90% BOD text.	The following text will be added to Appendix B Section 6.3. “<u>As the sensitivity analysis was focused on the solute transport modeling using the submodel, specific sensitivity analyses relevant to the groundwater flow model parameters were not conducted. Parameters that were not adjusted in the sensitivity analyses include: hydraulic conductivity, leakance/ vertical hydraulic conductivity, riverbed conductance, and recharge.</u>” As described in RTC #441, a sensitivity analysis on porosity will be added to Appendix B. PG&E will review and consider the Tribes’ response (dated Sept 18 and 21, 2015) to PG&E’s evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			Comment noted. The Tribe requests that PG&E consultants consider the various recommendations outlined in the Prucha & Eggers whitepaper on MW-X/MW-Y) , specifically fixing and re-calibrating the model to all available data (including AZ wells MW-54, MW-55 and MW-56) so that additional sensitivity analysis can be performed to evaluate the range of proposed remediation system impacts on flows/fate/ transport in the vicinity of the Colorado River and within Arizona, especially given the high conceptual model uncertainty (i.e., configuration/hydraulic conductivity of the assumed paleo channel, distribution/configurati on of high conductivity gravels (500 to 900 ft/d) extending from outlet of Sacramento Wash into the Colorado River Floodplain).	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
470	Hualapai/TRC RTC, 60% #382	Non-design	GW Modeling	Append B 6.3	(orig comment #382 response)....” *An additional paragraph will be added to list the parameters that were not adjusted during this solute transport model sensitivity analysis.”*	This additional description does not seem to have been included in the 90% BOD text.	See above			Hualapai request that PG&E consultants consider the various recommendations outlined in the Prucha & Eggers whitepaper on MW-X/MW-Y) , specifically fixing and re-calibrating the model to all available data (including AZ wells MW-54, MW-55 and MW-56) so that additional sensitivity	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										analysis can be performed to evaluate the range of proposed remediation system impacts on flows/fate/ transport in the vicinity of the Colorado River and within Arizona, especially given the high conceptual model uncertainty (i.e., configuration/hydraulic conductivity of the assumed paleo channel, distribution/configuration of high conductivity gravels (500 to 900 ft/d) extending from outlet of Sacramento Wash into the Colorado River Floodplain).	
471	Cocopah/TRC RTC, 60% #382	Non-design	GW Modeling	Append B 6.3	(orig comment #382 response)....” *An additional paragraph will be added to list the parameters that were not adjusted during this solute transport model sensitivity analysis.”*	This additional description does not seem to have been included in the 90% BOD text.	See above			Comment noted. The Tribes request that PG&E consultants consider the various recommendations outlined in the Prucha & Eggers whitepaper on MW-X/MW-Y) , specifically fixing and re-calibrating the model to all available data (including AZ wells MW-54, MW-55 and MW-56) so that additional sensitivity analysis can be performed to evaluate the range of proposed remediation system impacts on flows/fate/ transport in the vicinity of the Colorado River and within Arizona, especially given the high conceptual model uncertainty (i.e., configuration/hydraulic conductivity of the assumed paleo channel, distribution/configuration of high conductivity gravels (500 to 900 ft/d) extending from outlet of Sacramento Wash into the Colorado River Floodplain).	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
472	Chemehuevi/ TRC RTC, 60%	Non-design	GW Modeling	Append B 6.3	(orig comment #382 response)....”	This additional description does not seem to have been included in the 90% BOD text.	See above			Comment noted. The Tribes request that PG&E consultants	DTSC/DOI response: Agencies will provide direction to PG&E in

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	#382				*An additional paragraph will be added to list the parameters that were not adjusted during this solute transport model sensitivity analysis."*					consider the various recommendations outlined in the Prucha & Eggers whitepaper on MW-X/MW-Y) , specifically fixing and re-calibrating the model to all available data (including AZ wells MW-54, MW-55 and MW-56) so that additional sensitivity analysis can be performed to evaluate the range of proposed remediation system impacts on flows/fate/ transport in the vicinity of the Colorado River and within Arizona, especially given the high conceptual model uncertainty (i.e., configuration/hydraulic conductivity of the assumed paleo channel, distribution/configuration of high conductivity gravels (500 to 900 ft/d) extending from outlet of Sacramento Wash into the Colorado River Floodplain).	a separate letter.
473	FMIT/TRC	Non-design	GW Modeling	Append B 7.4 p. 59	""The initial pumping conditions simulated were NTH IRZ operation for a 6-month period (300 gpm injection and extraction) with active carbon injection, followed by a 3-month period where the NTH IRZ is shutoff and the River Bank Extraction Wells are turned on at 150 gpm and the extracted water is injected into IRL-1 and IRL-2."	Was the effect of seasonal variation in river stage cycle on timing of the actual proposed final remedial system design/operation of the NTH IRZ on/off (6/18 month) cycle evaluated – using the regional flow model? For example, when is the best time to start/stop IRZ cycle, and could IRL injection/Riverbank extraction rates/timing utilize river stage fluctuations to any advantage? Are there any disadvantages to not simulating actual river fluctuations? Any benefits of modeling this now to optimize operations before startup, or at least before changes are proposed to the initial operation schedules?	The transient variation of the river stage was assessed with the solute transport submodel and the analysis was conducted by starting the remedy while the Colorado River was at its lowest stage to maximize flow conditions towards the Colorado River (enhance floodplain flushing). This would be the ideal timing, but in comparing the transient transport to the steady state transport with average conditions, the results were similar. This indicates a low degree of sensitivity to river stage during remedy operation. PG&E will review and consider the Tribes' response (dated Sept 18			It is difficult to believe that the regional MicroFEM model wouldn't have also been used to simulate transient flow conditions, as it is our understanding that boundary conditions are transferred from regional to local submodel. The Prucha & Eggers whitepaper (July, 2015) on MW-X and MW-Y identified several problems with how river-aquifer interaction was specified in the model, especially where no river cells were specified in the submodel. In addition, the 90%BOD Appendix B documentation only suggests one proposed remedial configuration (NOT the one currently	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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							and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			proposed) was evaluated in a transient river stage scenario. The Tribe believes it is in the best interest of all stakeholders to simulate a similar transient river stage fluctuation a) using the currently proposed remediation design/ operation, b) conduct the scenario AFTER fixing/re-calibrating the model as per the recommendations made in the Prucha and Eggers July 2015 whitepaper, and c) consider simulating a range of possible outcomes (i.e., a predictive sensitivity analysis) so that all stakeholders can better understand what the range of actual transient system behavior (flows and fate/transport) might actually be.	
474	Hualapai/TRC	Non-design	GW Modeling	Append B 7.4 p. 59	""The initial pumping conditions simulated were NTH IRZ operation for a 6-month period (300 gpm injection and extraction) with active carbon injection, followed by a 3-month period where the NTH IRZ is shutoff and the River Bank Extraction Wells are turned on at 150 gpm and the extracted water is injected into IRL-1 and IRL-2."	Was the effect of seasonal variation in river stage cycle on timing of the actual proposed final remedial system design/operation of the NTH IRZ on/off (6/18 month) cycle evaluated – using the regional flow model? For example, when is the best time to start/stop IRZ cycle, and could IRL injection/Riverbank extraction rates/timing utilize river stage fluctuations to any advantage? Are there any disadvantages to not simulating actual river fluctuations? Any benefits of modeling this now to optimize operations before startup, or at least before changes are proposed to the initial operation schedules?	See above			It is difficult to believe that the regional MicroFEM model wouldn't have also been used to simulate transient flow conditions, as it is our understanding that boundary conditions are transferred from regional to local submodel. The Prucha & Eggers whitepaper (July, 2015) on MW-X and MW-Y identified several problems with how River-Aquifer interaction was specified in the model, especially where no river cells were specified in the submodel. In addition, the 90%BOD Appendix B documentation only suggests one proposed remedial configuration (NOT the one currently proposed) was evaluated in a transient river stage scenario.	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										The Tribes believe it is in the best interest of all stakeholders to simulate a similar transient river stage fluctuation a) using the currently proposed remediation design/ operation, b) conduct the scenario AFTER fixing/re-calibrating the model as per the recommendations made in the Prucha and Eggers July 2015 whitepaper, and c) consider simulating a range of possible outcomes (i.e., a predictive sensitivity analysis) so that all stakeholders can better understand what the range of actual transient system behavior (flows and fate/ transport) might actually be.	
475	Cocopah/TRC	Non-design	GW Modeling	Append B 7.4 p. 59	“”The initial pumping conditions simulated were NTH IRZ operation for a 6-month period (300 gpm injection and extraction) with active carbon injection, followed by a 3-month period where the NTH IRZ is shutoff and the River Bank Extraction Wells are turned on at 150 gpm and the extracted water is injected into IRL-1 and IRL-2.”	Was the effect of seasonal variation in river stage cycle on timing of the actual proposed final remedial system design/operation of the NTH IRZ on/off (6/18 month) cycle evaluated – using the regional flow model? For example, when is the best time to start/stop IRZ cycle, and could IRL injection/Riverbank extraction rates/timing utilize river stage fluctuations to any advantage? Are there any disadvantages to not simulating actual river fluctuations? Any benefits of modeling this now to optimize operations before startup, or at least before changes are proposed to the initial operation schedules?	See above			It is difficult to believe that the regional MicroFEM model wouldn't have also been used to simulate transient flow conditions, as it is our understanding that boundary conditions are transferred from regional to local submodel. The Prucha & Eggers whitepaper (July, 2015) on MW-X and MW-Y identified several problems with how River-Aquifer interaction was specified in the model, especially where no river cells were specified in the submodel. In addition, the 90%BOD Appendix B documentation only suggests one proposed remedial configuration (NOT the one currently proposed) was evaluated in a transient river stage scenario. The Tribes believe it is in the best interest of all stakeholders to	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										simulate a similar transient river stage fluctuation a) using the currently proposed remediation design/ operation, b) conduct the scenario AFTER fixing/re-calibrating the model as per the recommendations made in the Prucha and Eggers July 2015 whitepaper, and c) consider simulating a range of possible outcomes (i.e., a predictive sensitivity analysis) so that all stakeholders can better understand what the range of actual transient system behavior (flows and fate/ transport) might actually be.	
476	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 7.4 p. 59	""The initial pumping conditions simulated were NTH IRZ operation for a 6-month period (300 gpm injection and extraction) with active carbon injection, followed by a 3-month period where the NTH IRZ is shutoff and the River Bank Extraction Wells are turned on at 150 gpm and the extracted water is injected into IRL-1 and IRL-2."	Was the effect of seasonal variation in river stage cycle on timing of the actual proposed final remedial system design/operation of the NTH IRZ on/off (6/18 month) cycle evaluated – using the regional flow model? For example, when is the best time to start/stop IRZ cycle, and could IRL injection/Riverbank extraction rates/timing utilize river stage fluctuations to any advantage? Are there any disadvantages to not simulating actual river fluctuations? Any benefits of modeling this now to optimize operations before startup, or at least before changes are proposed to the initial operation schedules?	See above			It is difficult to believe that the regional MicroFEM model wouldn't have also been used to simulate transient flow conditions, as it is our understanding that boundary conditions are transferred from regional to local submodel. The Prucha & Eggers whitepaper (July, 2015) on MW-X and MW-Y identified several problems with how River-Aquifer interaction was specified in the model, especially where no river cells were specified in the submodel. In addition, the 90%BOD Appendix B documentation only suggests one proposed remedial configuration (NOT the one currently proposed) was evaluated in a transient river stage scenario. The Tribes believe it is in the best interest of all stakeholders to simulate a similar transient river stage fluctuation a) using the	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										currently proposed remediation design/ operation, b) conduct the scenario AFTER fixing/re-calibrating the model as per the recommendations made in the Prucha and Eggers July 2015 whitepaper, and c) consider simulating a range of possible outcomes (i.e., a predictive sensitivity analysis) so that all stakeholders can better understand what the range of actual transient system behavior (flows and fate/ transport) might actually be.	
477	DOI-30	Design	GW Modeling	8.1.2/63	[Mn(II) half-life = 8.3 hours for dissolved oxygen greater than 2.5 mg/L], corresponding to the lowest hyporheic zone rate observed by Harvey and Fuller (1998).	Please clarify where in the Harvey and Fuller paper the first-order rate coefficient of 0.083 h^{-1} was obtained. The Harvey and Fulley text on the bottom of page 632 states "considering the fast timescale of laboratory uptake (<6 hours) for all experiments, the range in rescaled rate constants for unpoisoned sediments from Pinal Creek was 0.28-0.69 h^{-1}."	See RTC #437. The text in Section 8.1.2 will be modified as follows: "…corresponding to the lowest hyporheic zone rate observed by Harvey and Fuller (1998), who reported a range of hyporheic zone time constants (inverse of the rate constant) between 1 and 12 hours (see table 3, Harvey and Fuller 1998)."		Resolved.		Resolved.
478	DOI-31	Non-design	GW Modeling	8.1.2/63	Based on the literature observations discussed in Section 5.3, the oxidation rate was assumed first order with respect to Mn(II) concentration above 2.5 mg/L (i.e., independent of dissolved oxygen content above 30% dissolved oxygen saturation) and second order with respect to Mn(II) and dissolved oxygen (first order with	Please explain the origin of the 2.5 mg/L dissolved oxygen and oxidation rate assumptions. Marble et. al. (1999) state "DO concentrations in the hyporheic zone at Pinal Creek typically decrease with depth from about 60 µM at the interface with surface water to the merging groundwater value of about 3 µM." A conversion of 60 µM of DO results in a concentration of 1.92 mg/L [60 µM x32 g/M) = 1920 µg = 1.9 mg/L]. Therefore, the highest DO concentrations and resulting Mn oxidation appear to have been calculated at DO values less than 2 mg/L. Mn oxidation rates as a function of DO concentrations could not be readily identified in the other reference cited for the Mn oxidation assumptions (Harvey and Fuller, 1998).	Marble et al. (1999) state on Page 7 of the text (section entitled Dissolved-O2 Dependence) and on Figure 6 that the net rate of Mn(II) removal is independent of DO above 30% air saturation and first-order with respect to the dissolved oxygen concentration below 30% air saturation. The value of 2.5 mg/L DO was calculated as 30% of 8 mg/L (the approximate concentration of dissolved oxygen at 100% air saturation). The text in Section 5.3.3 (which is cited in Section 8.1.2) will be modified as follows: "Further work (Marble et al. 1999) demonstrated that these				Comment resolved pending DOI review of the final design documents.

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					respect to each) below 2.5 mg/L (Marble et al. 1999).		rates were independent of dissolved oxygen concentration above 30% saturation (approximately 2.5 mg/L assuming an air-saturated dissolved oxygen concentration of 8 mg/L) and first-order with respect to dissolved oxygen concentration below 30%."				
479	DOI-32	Design	GW Modeling	8.1.2/63	Very limited information is available on the actual hyporheic zone thickness for the Colorado River at the Site.	The degree of Mn oxidization will be very sensitive to the thickness of the hyporheic zone. The current assumption of 2 feet appears fairly arbitrary and non-conservative (e.g., redox and mixing conditions indicate that it is less than 6 feet). Harvey and Fuller (1998) use tracers and mathematical equations to provide a means to estimate the hyporheic zone thickness that they consider a good assumption for streams that are much wider than they are deep. It looks like the thickest hyporheic zone depth they predicted or measured was 17 cm. Please explain whether there is any other supporting rationale for assuming a thickness for the hyporheic zone of about 60 cm.	The thickness of the hyporheic zone will be highly specific to the stream or river system, depending on a number of factors related to groundwater discharge and stream dynamics. Although Harvey and Fuller achieved a detailed quantification of the hyporheic zone thickness, their hyporheic zone thickness can only be applied to their particular stream system. For example, other studies have indicated hyporheic zone depths from 50 cm to as high as 10 meters, based upon a publically-available document by the Environment Agency, U.K. (Groundwater-surface water interactions in the hyporheic zone, Science Report SC030155/SR1, 2005; see Hendricks and White, 1991 and Triska et al., 1989 as cited in this document). Justification for the hyporheic zone depth in the final design will also consider the results of sediment porewater temperature measurements collected at Topock during the Porewater and Seepage Study performed by CH2M-Hill in 2006. These and other available literature references will be compiled and provided		Accepted.		Comment resolved pending DOI review of the final design documents.

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							as a basis for the assumed hyporheic zone depth at Topock in the 100% design. In addition, the 100% design will include a sensitivity analysis on the hyporheic zone depth.				
480	DOI-33	Non-design	GW Modeling	8.1.2/63	As a sensitivity test, the model was also run with a rate constant decreased by factors of 5 and 10 (half-lives of 42 and 83 hours for dissolved oxygen greater than 2.5 mg/L, respectively).	Please provide a reference to the section where the results of the sensitivity analysis are discussed.	The following text will be added: "The results of the sensitivity analyses are shown in Table 8.2-1 and discussed in Section 8.2."		Resolved.		Resolved.
481	DOI-34	Design	GW Modeling	8.1.2/63	The assigned dissolved oxygen profile consisted of river water dissolved oxygen concentrations persisting to 1-foot, and then dropping linearly to zero between 1-foot and 2-feet, for a total hyporheic or mixing zone depth of 2 feet (see Figure 8.2-1).	If there is some assumption regarding the oxygen profile with respect to any other parameters or Mn interface calculations it needs to be described. The Mn interface calculation appears to be performed simply by taking the thickness of the hyporheic zone and adjusting the initial concentrations by the half-life and travel time.	It is true that in the ultimate realization of the hyporheic zone model, the Mn interface concentration could have been approximated simply by adjustment of the influent boundary concentration based on the oxidation half-life and travel time (or residence time) within the hyporheic zone. However, the geochemical reactive transport model serves to validate this point; in particular, that other geochemical factors (including thermodynamic stability of the precipitated phase and Mn(II) adsorption) do not impact the result. In addition, the model accounts for the second-order attenuation of manganese for dissolved oxygen concentrations below 30% air-saturation, although this effect is minor. This point will be described in Section 8.1 of Appendix B. There are no other assumptions regarding the oxygen profile with		Resolved.		Resolved.

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							respect to any other parameters, other than what is already described in the text.				
482	DOI-35	Non-design	GW Modeling	8.2 Table 8.2-1/65	2. IRZ Active Conditions 10x half-life: 83 hours	The hyporheic zone is assumed to be 2 feet thick (8.1.2, p. 63), and the groundwater velocity through the hyporheic zone is 0.12 ft/day (8.1.1 p. 64). Therefore, Mn takes approximately 16 days (384 hours) to travel this distance. At a half-life of 83 hours approximately 4.626 half-lives will pass. Since the initial concentration is 2000 ug/L the following equation can be used to estimate river interface concentrations. $2000 \times 0.5^{4.626} = 81$ or 4% Since the calculated value of 81 is also the model prediction (see Table 8.2-1) it appears that the approach outlined above captures the fundamental processes that are simulated by the model. So a key question that strongly controls the predicted Mn concentrations entering the river is; will the Mn residence times in the hyporheic zone really be as long as those assumed in the modeling? Conceptually, the hyporheic zone is supposed to be a relatively thin region where groundwater and surface water are easily exchanged leading to elevated oxygen content that stimulates enhanced biological activity. In fact, the Harvey and Fuller paper cited in Appendix B describes this interchange as also being responsible for removal of the Mn already in the stream. Essentially, the hyporheic zone scrubs the stream of Mn as the Mn and surface water enters the hyporheic zone this exchange may happen multiple times over a basin scale. As further noted in Harvey and Fuller (p. 624) "The cumulative effect of enhanced manganese oxidation in the hyporheic zone was a 20% decrease in the load of manganese flowing out of the drainage basin**."** While the assumptions with the current modeling approach would lead to a 95+% reduction in the Mn loading rates. This may be the case, but the apparent discrepancy between the length of time the Mn is allowed to reside in the hyporheic zone in the model with the high permeabilities that would be required to form the hyporheic zone need to be resolved. Please provide additional justification for the long residence Mn residence times assumed in hyporheic zone in the model.	It is true that in the ultimate realization of the hyporheic zone model, the Mn interface concentration could have been approximated simply by adjustment of the influent boundary concentration based on the oxidation half-life and travel time (or residence time) within the hyporheic zone. However, the geochemical reactive transport model serves to validate this point; in particular, that other geochemical factors (including thermodynamic stability of the precipitated phase and Mn(II) adsorption) do not impact the result. In addition, the model accounts for the second-order attenuation of manganese for dissolved oxygen concentrations below 30% air-saturation, although this effect is minor. This point will be described in Section 8.1 of Appendix B. It is true that the reduction in manganese loading rate described by Harvey and Fuller was smaller (20%) than what is predicted at Topock (95+%). However, as the reviewer points out, it is important to note that Harvey and Fuller were describing oxidative attenuation of manganese that was already in the creek (as well as groundwater manganese), which relies on transfer of creek water dissolved manganese into the hyporheic zone for attenuation. In contrast,				Comment resolved pending DOI review of the final design documents and sensitivity analysis.

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							the Topock hyporheic zone model considers attenuation of manganese that must pass through the hyporheic zone before getting to the river. Accordingly, it may be anticipated that a greater level of attenuation may be achieved. While the depth of the hyporheic zone will be controlled by such factors as river dynamics, streambed geometry, and river sediment permeability, the velocity of the groundwater discharging to the river will more strongly be controlled by the groundwater gradient and aquifer properties within the floodplain upgradient of the hyporheic zone. Groundwater velocities were assigned based on the site-wide solute transport model. Accordingly, because the groundwater flux and the hyporheic zone depth are controlled by different factors, the assumed groundwater velocity which controls the residence time and the 2-ft hyporheic zone depth are not believed to be inconsistent. Literature references that provide a justification for hyporheic zone depths greater than that observed by Harvey and Fuller, as described in Comment #479, will be included in the 100% design. In addition, the 100% design will include a sensitivity analysis on the hyporheic zone depth.				
483	DOI-36	Design	GW Modeling	9.2/p.70	As discussed in Section 3, these parameters [pH] are not	A common issue with organic substrates is the production of H^+ which lowers the pH and in turn has a detrimental effect on the microbial populations which are largely responsible for creating the reducing conditions. Does the aquifer have enough buffering capacity for neutralizing the free hydrogen for many years in the future?	Organic matter consumption will proceed via numerous pathways, including aerobic (coupled to		Resolved.		Resolved.

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					expected to have a significant impact on organic matter biodegradation or Cr(VI) reductive precipitation given the ranges observed within the floodplain.		dissolved oxygen) and anaerobic pathways (coupled to Cr(VI), sulfate, nitrate, iron, etc.). Although it is common for acidity to be produced for fermentation reactions, the same is not the case for aerobic and anaerobic oxidation. In particular, anaerobic oxidation of ethanol and lactate (used in pilot testing) consume rather than generate H+. Complete aerobic oxidation of ethanol (the substrate currently chosen for the final remedy design) yields carbon dioxide (3 moles per mole of ethanol), with no additional H+ generation. Although the aerobic reaction will add dissolved CO2 (carbonic acid) to the solution, it is anticipated that this will be balanced by anaerobic reactions. Example reactions for ethanol are as follows: Aerobic: C2H6O + 3O2(g) = 2 CO2(g) + H2O Anaerobic (all alkalinity generating/H+ consuming): C2H6O + 2.4 NO3- + 0.4 H+ = 1.2 N2(g) + 2 HCO3- + 2.2 H2O C2H6O + 1.5 SO4-2 = HS- + 0.5 H2S + 2 HCO3- + H2O The anaerobic processes and alkalinity production will be the dominant processes and it is anticipated that minimal buffering capacity by the aquifer solids will be required to maintain circumneutral pH. This has thus far been demonstrated at				

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							Hinkley, where remedy operation over a time span exceeding 7 years has not resulted in consumption of aquifer buffering capacity. Likewise, it is anticipated that the aquifer solids at Topock have sufficient buffering capacity.				
484	DOI-37	Non-design	GW Modeling	10.4/p.79	The decreased and increased stoichiometric generation ratios are 0.005 and 0.05, respectively.	Please provide a basis for assigning this range. In particular, could the generation ratios get much higher than 0.05?	The ranges assigned for each model parameter in the sensitivity analysis were based on a best assessment of appropriate levels of uncertainty. Although many of these ranges were difficult to quantify with limited information, the ranges that were chosen fully bracket the actual anticipated level of parameter uncertainty. The manganese generation ratio of 0.016 was estimated based on site-specific pilot testing information that is anticipated to be highly representative of field-scale implementation conditions. The value of 0.05 represents a factor of 3 increase in this ratio, which is believed to be more than sufficient to capture the anticipated level of variability		Resolved.		Resolved.
485	DOI-38	Design	GW Modeling	10.4/p.80	Similar to manganese, arsenic sorption was simulated using the non-linear Freundlich isotherm ($C^* = KC^N$), where K and N are constants that were calibrated to site-specific conditions as described in Section 5.4. In all three sorption scenarios, the N exponent was held	For both manganese and arsenic, if both K and N were calibrated to site data why was the range on K tested in the sensitivity analysis rather than that of N which could have led to a much larger increase in dissolved phase concentrations?	The purpose of the sensitivity analysis was to vary model parameters to capture the reasonable anticipated range in uncertainty and variability of the processes being modeled. Specifically, the model sorption parameter sensitivity ranges were chosen to capture the actual anticipated range in sorption behavior. In the case of manganese and arsenic sorption, these ranges were further constrained by considering known		Resolved.		Resolved.

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					constant at 0.465, while the K multiplier was varied.		variability in aqueous geochemistry (see Section 9.2). Although variability in sorption behavior also could have been captured by varying N, this was not necessary; varying K alone was sufficient to capture the effects of variability in sorption behavior. It is true that, depending on the range applied to N, varying this parameter could have resulted in a larger increase in dissolved phase concentrations; however, that would not represent a realistic scenario given the anticipated extent of variability in sorption behavior.				
486	DOI-39	Non-design	GW Modeling	10.6/p.81	While this increase in Cr(VI) retardation would suggest significantly longer remediation timeframes, this is not a likely scenario as the understanding of groundwater flow and plume development suggests a Cr(VI) Kd of 0.5 L/kg would be excessive. This sensitivity analysis was done for comparative purposes to gauge the relative impact of Cr(VI) sorption.	The remediation times are almost always extremely sensitive to the Kd of the contaminant. Therefore, it is unclear why Kd values would be tested outside of the expected range when a major outcome of the sensitivity analysis should be evaluating the range of potential remediation times. What Kd value is the expected upper range based on the understanding of the plume development?	A laboratory study on aerobic core samples from the Site (CH2M Hill, 2005, *Summary of Results—Aerobic Zone Hexavalent Chromium Core Testing*) indicated the range in Kd values from two aerobic core samples collected from the flood plain varied between 0.01 and 0.09 L/kg. This study therefore supports the value of 0.05 L/kg utilized in the baseline hexavalent chromium modeling. A reference to this technical memo will be added to the text.		Accepted.		Comment resolved pending DOI review of the final design documents.
487	DOI-40	Design	GW Modeling	10.6/p.81	While this increase in Cr(VI) retardation would suggest significantly longer remediation timeframes,	Since the Kds tend to have the greatest uncertainty and most sensitivity to the remediation times, this assumption is one of the most important in the entire modeling analysis. Please provide additional information as to where the plume development was investigated and Kds estimated.	The original regional groundwater flow model was calibrated to 4 data sets: 1. Recovery period after shutdown of TW-2D in November 2004;		Accepted.		Comment resolved pending DOI review of the final design documents.

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					this is not a likely scenario as the understanding of groundwater flow and plume development suggests a Cr(VI) Kd of 0.5 L/kg would be excessive.		2. Average monthly groundwater elevations between 2003 and March 2005; 3. Injection well testing at IW-2 and IW-3 in January 2005; and 4. Evolution of the Cr(VI) plume footprint from 1951 to 1999 (CH2M Hill, 2005). The final calibration period that focused on the plume evolution from 1951 to 1999 was divided into 3 stages to reflect different hydraulic stresses in the system over time. Even though this calibration was only performed with respect to groundwater flow and minimal historical Cr(VI) data were available throughout the Site, the analysis was consistent with the observed evolution and final footprint of the Cr(VI) plume. This result supports the conclusion that Cr(VI) in groundwater not a strongly sorbed compound that travels freely through the general oxidizing conditions of the alluvial area between Bat Cave Wash and the MW-20 cluster. This transport behavior that is similar to advective groundwater flow supports the use of a relatively low Kd value that would translate to a low retardation factor. A retardation factor was integrated into the model as a conservative assumption with respect to remedial timeframe, and a higher Kd value was evaluated in the solute transport model sensitivity analysis. A laboratory study on				

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							aerobic core samples from the Site (CH2M Hill, 2005, *Summary of Results—Aerobic Zone Hexavalent Chromium Core Testing*) indicated the range in Kd values from two aerobic core samples collected from the flood plain varied between 0.01 and 0.09 L/kg. This study therefore supports the value of 0.05 L/kg utilized in the baseline hexavalent chromium modeling. A reference to this technical memo will be added to the text.				
488	DOI-41	Non-design	GW Modeling	12/p. 91	Model Update Procedure	The linkage between the regional model and local model through the flux boundaries will continue to add a complexity to the analysis that may not be necessary. Furthermore, if refinements to the transmissivities are made through model calibration or manually in the local scale model and not in the regional model, the boundary fluxes predicted with the regional model will begin to diverge from the more accurate flow conditions predicted by the local model. It is recommended that PG&E determine how far out boundary effects may be experienced under the most stress-induced conditions and moving the boundaries in the local model to those locations. It is further recommended that only the local model be used in the future.	See RTC #431 DOI-16				
489	DOI-42	Design	GW Modeling	12/p. 91	Model Update Procedure	As the model update text is currently written the decision as to what actually triggers whether the model will every require updating is ambiguous (p. 91) If there are significant differences, the groundwater flow model, geochemical model, and/or the solute transport model will be updated and recalibrated. (p. 91) During the well construction period the groundwater flow and solute transport model will be updated annually, if the data collected suggests that updates are needed. Quantitative criteria need to be developed to determine whether the model needs to be updated and recalibrated. It is currently very unclear of what the model will be used for. It seems that, at a minimum, it should be used to support the capture zone analysis, optimize the remediation system pumping/injection/dosing rates; assist in determining whether the system is performing as designed; and updating remediation time estimates. There should be a section after Section 12 that provides a detailed discussion how the model will be actually be used (including performance metrics) to support these activities.	See RTCs #76 FMIT/TRC, #77 Hualapai/TRC, #78 Cocopah/TRC, and #79 Chemehuevi/TRC The language "if there are significant differences" and "if the data collected suggests that updates are needed" will be removed and the model update schedule discussed in Appendix B Section 12 will be used. An additional paragraph will be added to Appendix B Section 12 to discuss the intended future use of the model including updating remediation time frame estimates, supporting capture zone analyses, and analyzing potential remedy design operation changes.				Comment resolved pending DOI review of the final design documents.
490	FMIT/TRC	Non-design	GW Modeling	Append B 12 p.. 91	"to ensure that the groundwater flow, geochemical, and solute transport models do not	This is confusing. Given the importance to the development of the design and operation of the proposed remedial system, the proposed updates and use of models are confusing and vague and should be clarified. For example, exactly how and when would any differences between these various models and the conceptual site model w/respect to characterization or remedy performance be done?	See RTCs #76 FMIT/TRC, #77 Hualapai/TRC, #78 Cocopah/TRC, #79 Chemehuevi/TRC, and #489 DOI-42. The language "if there are significant			Comment noted. Text in Appendix B, Section 12 doesn't present any discussion at all on how the four models (microfem, modflow, mt3d, phreeqc) will be re-calibrated, or if any	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					differ significantly from the conceptual site model with respect to the hydrogeologic characterization or remedy performance"		differences" and "if the data collected suggests that updates are needed" will be removed and the model update schedule discussed in Appendix B Section 12 will be used. An additional paragraph will be added to Appendix B Section 12 to discuss the intended future use of the model including updating remediation time frame estimates, supporting capture zone analyses, and analyzing potential remedy design operation changes. PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			calibration or predictive sensitivity analyses might be considered to help guide operation and need for new wells, optimization simulations/constraints to determine the number/ locations/ depths of any new wells required to meet ongoing system performance metrics (i.e., short-/long-term RAOs), or any uncertainty analyses to evaluate impacts of the system, for example in Arizona, or length of time required to clean up the contamination. Finally – PG&E consultants should strongly consider addressing the numerous recommendations provided in the Prucha and Eggers (July 15, 2015) whitepaper on fixing/revising the existing model before the substantial amount of new data becomes available. Our ongoing concern continues to be that ignoring errors/ uncertainties in the current deficient models now eliminates the potential to reconfigure the current design/operation BEFORE considerable efforts/costs have been incurred in a cultural area that is highly sensitive to each and every new borehole or well installed in the system.	
491	Hualapai/TRC	Non-design	GW Modeling	Append B 12 p.. 91	"to ensure that the groundwater flow, geochemical, and solute transport models do not differ significantly	This is confusing. Given the importance to the development of the design and operation of the proposed remedial system, the proposed updates and use of models are confusing and vague and should be clarified. For example, exactly how and when would any differences between these various models and the conceptual site model w/respect to characterization or remedy performance be done?	See above			Comment noted. Text in Appendix B, Section 12 doesn't present any discussion at all on how the four models (microfem, modflow, mt3d, phreeqc) will be re-calibrated, or if any calibration or predictive sensitivity analyses	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					from the conceptual site model with respect to the hydrogeologic characterization or remedy performance"					might be considered to help guide operation and need for new wells, optimization simulations/constraints to determine the number/locations/ depths of any new wells required to meet ongoing system performance metrics (i.e., short-/long-term RAOs), or any uncertainty analyses to evaluate impacts of the system, for example in Arizona, or length of time required to clean up the contamination. Finally – PG&E consultants should strongly consider addressing the numerous recommendations provided in the Prucha and Eggers (July 15, 2015) whitepaper on fixing/revising the existing model before the substantial amount of new data becomes available. Our ongoing concern continues to be that ignoring errors/uncertainties in the current deficient models now eliminates the potential to reconfigure the current design/operation BEFORE considerable efforts/costs have been incurred in a cultural area that is highly sensitive to each and every new borehole or well installed in the system.	
492	Cocopah/TRC	Non-design	GW Modeling	Append B 12 p.. 91	"to ensure that the groundwater flow, geochemical, and solute transport models do not differ significantly from the conceptual site	This is confusing. Given the importance to the development of the design and operation of the proposed remedial system, the proposed updates and use of models are confusing and vague and should be clarified. For example, exactly how and when would any differences between these various models and the conceptual site model w/respect to characterization or remedy performance be done?	See above			Comment noted. Text in Appendix B, Section 12 doesn't present any discussion at all on how the four models (microfem, modflow, mt3d, phreeqc) will be re-calibrated, or if any calibration or predictive sensitivity analyses might be considered to help guide operation	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					model with respect to the hydrogeologic characterization or remedy performance"					and need for new wells, optimization simulations/ constraints to determine the number/locations/depths of any new wells required to meet ongoing system performance metrics (i.e., short-/long-term RAOs), or any uncertainty analyses to evaluate impacts of the system, for example in Arizona, or length of time required to clean up the contamination. Finally – PG&E consultants should strongly consider addressing the numerous recommendations provided in the Prucha and Eggers (July 15, 2015) whitepaper on fixing/revising the existing model before the substantial amount of new data becomes available. Our ongoing concern continues to be that ignoring errors/uncertainties in the current deficient models now eliminates the potential to reconfigure the current design/operation BEFORE considerable efforts/costs have been incurred in a cultural area that is highly sensitive to each and every new borehole or well installed in the system.	
493	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 12 p.. 91	"to ensure that the groundwater flow, geochemical, and solute transport models do not differ significantly from the conceptual site model with	This is confusing. Given the importance to the development of the design and operation of the proposed remedial system, the proposed updates and use of models are confusing and vague and should be clarified. For example, exactly how and when would any differences between these various models and the conceptual site model w/respect to characterization or remedy performance be done?	See above			Comment noted. Text in Appendix B, Section 12 doesn't present any discussion at all on how the four models (microfem, modflow, mt3d, phreeqc) will be re-calibrated, or if any calibration or predictive sensitivity analyses might be considered to help guide operation and need for new wells,	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					respect to the hydrogeologic characterization or remedy performance”					optimization simulations/ constraints to determine the number/locations/depths of any new wells required to meet ongoing system performance metrics (i.e., short-/long-term RAOs), or any uncertainty analyses to evaluate impacts of the system, for example in Arizona, or length of time required to clean up the contamination. Finally – PG&E consultants should strongly consider addressing the numerous recommendations provided in the Prucha and Eggers (July 15, 2015) whitepaper on fixing/revising the existing model before the substantial amount of new data becomes available. Our ongoing concern continues to be that ignoring errors/uncertainties in the current deficient models now eliminates the potential to reconfigure the current design/operation BEFORE considerable efforts/costs have been incurred in a cultural area that is highly sensitive to each and every new borehole or well installed in the system.	
494	FMIT/TRC	Non-design	GW Modeling	Append B 12.1 p. 92	“Upon completion of the regional groundwater Flow model update, the submodel extents will be extracted from the regional groundwater flow model for use with the solute	Why wouldn’t there be any effort to calibrate to transport and fate parameters to changing CrVI distributions, so that current and future remedial system performance could be better evaluated, especially with any changes to operations or additional wells brought online? Will the modeling be used to re-optimize the system operation (not the design - as it has already been defined/installed now), and if so how?	Text will be adjusted to reflect that the geochemical model and the solute transport model will be recalibrated as well to observed concentration values and trends and available field parameters. The model will be used to provide recommended optimizations as far as system operation (i.e.			Comment noted. However the response is confusing. The model(s) should be used to simulate optimization scenarios to evaluate proposed system operations. The way this is stated suggests the model will somehow be used to "provide recommended optimizations as far as system operations",	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					transport model. The solute transport model will be updated with the available hexavalent chromium data to reflect updated initial plume conditions. The groundwater flow and solute transport submodel will then be utilized to rerun the initial baseline remedy to see if there are any concerns with the simulated hexavalent chromium transport projections and remediation design. At this point recommendations for changes in planned operational conditions, adjustments in the remedial design and/or the potential need for provisional wells may be considered.”		injection/extraction rates and frequency, TOC dosing frequency and concentration, and need for provisional wells).			which is vague and confusing, but it won't be used to do the actual optimization simulations. This optimization step is something that the groundwater community regularly performs. The Tribe highly recommends that PG&E consultants clarify their intentions on how they plan to use all model(s), particularly for any sort of optimization of either design changes (i.e., new wells/ optimum locations) AND/OR optimization of system operations. For the latter case, details on how optimizations will be performed, constraints, targets, key input adjustments, criteria/ values etc. should be clearly described in the 90% BOD documentation to maintain a high level of transparency for the Tribes and all Stakeholders	
495	Hualapai/TRC	Non-design	GW Modeling	Append B 12.1 p. 92	“Upon completion of the regional groundwater Flow model update, the submodel extents will be extracted from the regional groundwater flow model for use with the solute transport model. The solute transport	Why wouldn’t there be any effort to calibrate to transport and fate parameters to changing CrVI distributions, so that current and future remedial system performance could be better evaluated, especially with any changes to operations or additional wells brought online? Will the modeling be used to re-optimize the system operation (not the design - as it has already been defined/installed now), and if so how?	See above			Comment noted, however the response is confusing. The model(s) should be used to simulate optimization scenarios to evaluate proposed system operations. The way this is stated suggests the model will somehow be used to "provide recommended optimizations as far as system operations", which is vague and confusing, but it won't be used to do the actual optimization	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					model will be updated with the available hexavalent chromium data to reflect updated initial plume conditions. The groundwater flow and solute transport submodel will then be utilized to rerun the initial baseline remedy to see if there are any concerns with the simulated hexavalent chromium transport projections and remediation design. At this point recommendations for changes in planned operational conditions, adjustments in the remedial design and/or the potential need for provisional wells may be considered.”					simulations. This optimization step is something that the groundwater community regularly performs. The Tribes highly recommend that PG&E consultants clarify their intentions on how they plan to use all model(s) particularly for any sort of optimization of either design changes (i.e., new wells/optimum locations) AND/OR optimization of system operations. For the latter case, details on how optimizations will be performed, constraints, targets, key input adjustments, criteria/values etc. should be clearly described in the 90%BOD documentation to maintain a high level of transparency for the Tribes and all Stakeholders.	
496	Cocopah/TRC	Non-design	GW Modeling	Append B 12.1 p. 92	“Upon completion of the regional groundwater Flow model update, the submodel extents will be extracted from the regional groundwater flow model for use with the solute transport model. The solute transport model will be updated with the available hexavalent	Why wouldn’t there be any effort to calibrate to transport and fate parameters to changing CrVI distributions, so that current and future remedial system performance could be better evaluated, especially with any changes to operations or additional wells brought online? Will the modeling be used to re-optimize the system operation (not the design - as it has already been defined/installed now), and if so how?	See above			Comment noted, however the response is confusing. The model(s) should be used to simulate optimization scenarios to evaluate proposed system operations. The way this is stated suggests the model will somehow be used to "provide recommended optimizations as far as system operations", which is vague and confusing, but it won't be used to do the actual optimization simulations. This optimization step is something that the groundwater	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					chromium data to reflect updated initial plume conditions. The groundwater flow and solute transport submodel will then be utilized to rerun the initial baseline remedy to see if there are any concerns with the simulated hexavalent chromium transport projections and remediation design. At this point recommendations for changes in planned operational conditions, adjustments in the remedial design and/or the potential need for provisional wells may be considered."					community regularly performs. The Tribes highly recommend that PG&E consultants clarify their intentions on how they plan to use all model(s), particularly for any sort of optimization of either design changes (i.e., new wells/ optimum locations) AND/OR optimization of system operations. For the latter case, details on how optimizations will be performed, constraints, targets, key input adjustments, criteria/ values etc. should be clearly described in the 90%BOD documentation to maintain a high level of transparency for the Tribes and all Stakeholders.	
497	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 12.1 p. 92	"Upon completion of the regional groundwater Flow model update, the submodel extents will be extracted from the regional groundwater flow model for use with the solute transport model. The solute transport model will be updated with the available hexavalent chromium data to reflect updated initial plume	Why wouldn't there be any effort to calibrate to transport and fate parameters to changing CrVI distributions, so that current and future remedial system performance could be better evaluated, especially with any changes to operations or additional wells brought online? Will the modeling be used to re-optimize the system operation (not the design - as it has already been defined/installed now), and if so how?	See above			Comment noted, however the response is confusing. The model(s) should be used to simulate optimization scenarios to evaluate proposed system operations. The way this is stated suggests the model will somehow be used to "provide recommended optimizations as far as system operations", which is vague and confusing, but it won't be used to do the actual optimization simulations. This optimization step is something that the groundwater community regularly performs. The Tribes highly recommend that PG&E consultants	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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					conditions. The groundwater flow and solute transport submodel will then be utilized to rerun the initial baseline remedy to see if there are any concerns with the simulated hexavalent chromium transport projections and remediation design. At this point recommendations for changes in planned operational conditions, adjustments in the remedial design and/or the potential need for provisional wells may be considered."					clarify their intentions on how they plan to use all model(s), particularly for any sort of optimization of either design changes (i.e., new wells/ optimum locations) AND/OR optimization of system operations. For the latter case, details on how optimizations will be performed, constraints, targets, key input adjustments, criteria/ values etc. should be clearly described in the 90%BOD documentation to maintain a high level of transparency for the Tribes and all Stakeholders.	
498	FMIT/TRC	Non-design	GW Modeling	Append B 12.2 p.92	"By collecting the aforementioned data, the following parameters can potentially be refined in the groundwater flow and solute transport models:"	All model parameters, both flow and fate/transport, can be adjusted. Is this suggesting that only these parameters would be changed in the model? Why wouldn't mass transfer coefficients, or mobile/immobile porosity be adjusted? In the July 2005 Model Update memo, page 2-5 it states "Thickness of each model layer (except Layer 5) was assigned at each well location, with breaks between model layers sometimes corresponding to HSU contacts and sometimes dictated by screened intervals in well clusters. It is important to note that model layers often do not correlate with HSU boundaries. A model layer may contain more than one HSU, or an HSU may be split between more than one model layers." How exactly will new borehole/well information be incorporated into the existing model(s), and does the fact that model layers often don't correspond to HSU contacts have any implications for fate/transport simulations?	Agreed, all model parameters have the potential to be adjusted/refined. Parameters in Section 12.2 were listed as examples, but model updates are not limited to these parameters. Text will be clarified accordingly. The new borehole/well information will be incorporated by first verifying the model structure in the area (alluvial aquifer and bedrock contact) and then aquifer properties gained from well testing will be assessed. The vertical and lateral distributions of hydraulic conductivity values will be used to guide hydraulic conductivity values during the calibration process. Depending on the distribution, K values			Comment noted. However, it is our understanding that original regional MicroFEM model calibration made extensive use of the parameter estimation code PEST. We felt this code was poorly constrained in key areas, such as beneath the river and within Arizona where no data were available, even though data from MW-54, MW-55 and MW-56 have since been collected and are available. We continue to feel that more explanation is required on how all models (microfem, modflow, mt3d, phreeqc) will be updated and re-calibrated. If re-calibration is done using PEST, the details of how this will be	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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							may be averaged or used directly. Although the model layers don't correspond to specific HSU's in the heterogeneous alluvial aquifer, generalizations can still be made using the available K data to produce a representative K distribution. PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			implemented should be made transparent and very clear to the Tribes and all Stakeholders, so that more confidence is developed in model predictions going forward. Our understanding is that the models will continue to play a critical role in both evaluation of system performance (meeting RAOs) and guiding design changes and remedy operation.	
499	Hualapai/TRC	Non-design	GW Modeling	Append B 12.2 p.92	"By collecting the aforementioned data, the following parameters can potentially be refined in the groundwater flow and solute transport models:"	All model parameters, both flow and fate/transport, can be adjusted. Is this suggesting that only these parameters would be changed in the model? Why wouldn't mass transfer coefficients, or mobile/immobile porosity be adjusted? In the July 2005 Model Update memo, page 2-5 it states "Thickness of each model layer (except Layer 5) was assigned at each well location, with breaks between model layers sometimes corresponding to HSU contacts and sometimes dictated by screened intervals in well clusters. It is important to note that model layers often do not correlate with HSU boundaries. A model layer may contain more than one HSU, or an HSU may be split between more than one model layers." How exactly will new borehole/well information be incorporated into the existing model(s), and does the fact that model layers often don't correspond to HSU contacts have any implications for fate/transport simulations?	See above			Comment noted. However, it is our understanding that original regional MicroFEM model calibration made extensive use of the parameter estimation code PEST. We felt this code was poorly constrained in key areas, such as beneath the river and within Arizona where no data were available, even though data from MW-54, MW-55 and MW-56 have since been collected and are available. We continue to feel that more explanation is required on how all models (microfem, modflow, mt3d, phreeqc) will be updated and re-calibrated. If re-calibration is done using PEST, the details of how this will be implemented should be made transparent and very clear to the Tribes and all Stakeholders, so that more confidence is	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										developed in model predictions going forward. Our understanding is that the models will continue to play a critical role in both evaluation of system performance (meeting RAOs) and guiding design changes and remedy operation.	
500	Cocopah/TRC	Non-design	GW Modeling	Append B 12.2 p.92	"By collecting the aforementioned data, the following parameters can potentially be refined in the groundwater flow and solute transport models:"	All model parameters, both flow and fate/transport, can be adjusted. Is this suggesting that only these parameters would be changed in the model? Why wouldn't mass transfer coefficients, or mobile/immobile porosity be adjusted? In the July 2005 Model Update memo, page 2-5 it states "Thickness of each model layer (except Layer 5) was assigned at each well location, with breaks between model layers sometimes corresponding to HSU contacts and sometimes dictated by screened intervals in well clusters. It is important to note that model layers often do not correlate with HSU boundaries. A model layer may contain more than one HSU, or an HSU may be split between more than one model layers." How exactly will new borehole/well information be incorporated into the existing model(s), and does the fact that model layers often don't correspond to HSU contacts have any implications for fate/transport simulations?	See above			Comment noted. However, it is our understanding that original regional MicroFEM model calibration made extensive use of the parameter estimation code PEST. We felt this code was poorly constrained in key areas, such as beneath the river and within Arizona where no data were available, even though data from MW-54, MW-55 and MW-56 have since been collected and are available. We continue to feel that more explanation is required on how all models (microfem, modflow, mt3d, phreeqc) will be updated and re-calibrated. If re-calibration is done using PEST, the details of how this will be implemented should be made transparent and very clear to the Tribes and all Stakeholders, so that more confidence is developed in model predictions going forward. Our understanding is that the models will continue to play a critical role in both evaluation of system performance (meeting RAOs) and guiding design changes and remedy operation.	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.
501	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 12.2 p.92	"By collecting the aforementione	All model parameters, both flow and fate/transport, can be adjusted. Is this suggesting that only these parameters would be changed in the model? Why wouldn't mass transfer coefficients, or mobile/immobile porosity be adjusted?	See above			Comment noted. However, it is our understanding that	DTSC/DOI response: Agencies will provide direction to PG&E in

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					d data, the following parameters can potentially be refined in the groundwater flow and solute transport models:”	In the July 2005 Model Update memo, page 2-5 it states “Thickness of each model layer (except Layer 5) was assigned at each well location, with breaks between model layers sometimes corresponding to HSU contacts and sometimes dictated by screened intervals in well clusters. It is important to note that model layers often do not correlate with HSU boundaries. A model layer may contain more than one HSU, or an HSU may be split between more than one model layers.” How exactly will new borehole/well information be incorporated into the existing model(s), and does the fact that model layers often don’t correspond to HSU contacts have any implications for fate/transport simulations?				original regional MicroFEM model calibration made extensive use of the parameter estimation code PEST. We felt this code was poorly constrained in key areas, such as beneath the river and within Arizona where no data were available, even though data from MW-54, MW-55 and MW-56 have since been collected and are available. We continue to feel that more explanation is required on how all models (microfem, modflow, mt3d, phreeqc) will be updated and re-calibrated. If re-calibration is done using PEST, the details of how this will be implemented should be made transparent and very clear to the Tribes and all Stakeholders, so that more confidence is developed in model predictions going forward. Our understanding is that the models will continue to play a critical role in both evaluation of system performance (meeting RAOs) and guiding design changes and remedy operation.	a separate letter.
502	FMIT/TRC	Non-design	GW Modeling	Append B 12.2/ p. 93	“Comparing the simulated point water levels, potentiometric surfaces and hydraulic gradients to the observed field values, the regional groundwater flow model can be recalibrated under active remedy conditions if significant	What are the exact performance metrics (quantitative) that dictate whether significant differences exist and all model(s) needs to be recalibrated? Because the final remedial system model simulations assumed no river fluctuations, observed levels can’t be directly compared to simulated levels given the notable diurnal/seasonal river fluctuations and corresponding changes in groundwater levels. As such, why can't plans be to update and re-calibrate all models whenever changes to design/operations are proposed and then re-simulate future conditions to demonstrate long-term remedy performance still meets RAOs? Details on an approach/methodology for how the fate/transport model will be calibrated (for the first time) should be presented.	See RTC #76 FMIT/TRC, #77 Hualapai/TRC, #78 Cocopah/TRC, and #79 Chemehuevi/TRC The language “if there are significant differences” and “if the data collected suggests that updates are needed” will be removed and the model update schedule discussed in Appendix B Section 12 will be used. PG&E will review and consider the Tribes’			Comment noted. However, this response doesn't seem to address concerns raised in the original comment. We continue to emphasize the need to a) fix and re-calibrate the model now; and b) update and re-calibrate the model when new datasets become available, not after all infrastructure has been installed and all data has become available. Key benefits to updating the model	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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Groundwater Remedy Basis of Design Report/Final (100%) Design

PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					differences exist. Upon completion of the regional groundwater flow model update, the submodel will be updated accordingly and the solute transport model will be rerun to evaluate longer term remedy performance to evaluate the remedy timeframe.”		response (dated Sept 18 and 21, 2015) to PG&E’s evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			and then evaluating previous model predictions while data are being collected would be that any major deviations from what was expected could be addressed through 'adaptive management' adjustments in the design/operation BEFORE the entire system is installed. No details have been provided on exactly how the fate/transport model will be calibrated, calibration targets, allowable target tolerances etc. The Tribe highly recommends that this information be provided in the 90% BOD documentation to maintain a high level of transparency and confidence that the model(s) will be maintained at the highest level. This would ensure the highest level of understanding of the system which would in turn provide confidence to Tribes when/if PG&E consultants determine that new design wells are required in sensitive Tribal areas. All Tribes should feel confident that the best available model predictions have been made. To date, while the model remains a critical design and operational tool, the model predictions are viewed as being highly uncertain.	
503	Hualapai/TRC	Non-design	GW Modeling	Append B 12.2/ p. 93	“Comparing the simulated point water levels, potentiometric surfaces and hydraulic gradients to	What are the exact performance metrics (quantitative) that dictate whether significant differences exist and all model(s) needs to be recalibrated? Because the final remedial system model simulations assumed no river fluctuations, observed levels can’t be directly compared to simulated levels given the notable diurnal/seasonal river fluctuations and corresponding changes in groundwater levels. As such, why can't plans be to update and re-calibrate all models whenever changes to design/operations are proposed and then re-simulate future conditions to demonstrate long-term remedy performance still meets RAOs? Details on an approach/methodology for how the fate/transport model will be calibrated (for the first time) should be presented.	See above			Comment noted, however, this response doesn't seem to address concerns raised in the original comment. We continue to emphasize the need to a) fix and	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
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					the observed field values, the regional groundwater flow model can be recalibrated under active remedy conditions if significant differences exist. Upon completion of the regional groundwater flow model update, the submodel will be updated accordingly and the solute transport model will be rerun to evaluate longer term remedy performance to evaluate the remedy timeframe."					re-calibrate the model now; and b) update and re-calibrate the model when new datasets become available, not after all infrastructure has been installed and all data has become available. Key benefits to updating the model and then evaluating previous model predictions while data are being collected would be that any major deviations from what was expected could be addressed through 'adaptive management' adjustments in the design/operation BEFORE the entire system is installed. No details have been provided on exactly how the fate/transport model will be calibrated, calibration targets, allowable target tolerances etc. The Tribes highly recommend that this information be provided in the 90% BOD documentation to maintain a high level of transparency and confidence that the model(s) will be maintained at the highest level. This would ensure the highest level of understanding of the system which would in turn provide confidence to Tribes when/if PG&E consultants determine that new design wells are required in sensitive Tribal areas. All Tribes should feel confident that the best available model predictions have been made. To date, while the model remains a critical design and operational tool, the model predictions are	

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										viewed as being highly uncertain.	
504	Cocopah/TRC	Non-design	GW Modeling	Append B 12.2/ p. 93	"Comparing the simulated point water levels, potentiometric surfaces and hydraulic gradients to the observed field values, the regional groundwater flow model can be recalibrated under active remedy conditions if significant differences exist. Upon completion of the regional groundwater flow model update, the submodel will be updated accordingly and the solute transport model will be rerun to evaluate longer term remedy performance to evaluate the remedy timeframe."	What are the exact performance metrics (quantitative) that dictate whether significant differences exist and all model(s) needs to be recalibrated? Because the final remedial system model simulations assumed no river fluctuations, observed levels can't be directly compared to simulated levels given the notable diurnal/seasonal river fluctuations and corresponding changes in groundwater levels. As such, why can't plans be to update and re-calibrate all models whenever changes to design/operations are proposed and then re-simulate future conditions to demonstrate long-term remedy performance still meets RAOs? Details on an approach/methodology for how the fate/transport model will be calibrated (for the first time) should be presented.	See above			Comment noted, however, this response doesn't seem to address concerns raised in the original comment. We continue to emphasize the need to a) fix and re-calibrate the model now; and b) update and re-calibrate the model when new datasets become available, not after all infrastructure has been installed and all data has become available. Key benefits to updating the model and then evaluating previous model predictions while data are being collected would be that any major deviations from what was expected could be addressed through 'adaptive management' adjustments in the design/operation BEFORE the entire system is installed. No details have been provided on exactly how the fate/transport model will be calibrated, calibration targets, allowable target tolerances etc. The Tribes highly recommend that this information be provided in the 90% BOD documentation to maintain a high level of transparency and confidence that the model(s) will be maintained at the highest level. This would ensure the highest level of understanding of the system which would in turn provide confidence to Tribes when/if PG&E consultants determine that new design wells are required in	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										sensitive Tribal areas. All Tribes should feel confident that the best available model predictions have been made. To date, while the model remains a critical design and operational tool, the model predictions are viewed as being highly uncertain.	
505	Chemehuevi/ TRC	Non-design	GW Modeling	Append B 12.2/ p. 93	"Comparing the simulated point water levels, potentiometric surfaces and hydraulic gradients to the observed field values, the regional groundwater flow model can be recalibrated under active remedy conditions if significant differences exist. Upon completion of the regional groundwater flow model update, the submodel will be updated accordingly and the solute transport model will be rerun to evaluate longer term remedy performance to evaluate the remedy timeframe."	What are the exact performance metrics (quantitative) that dictate whether significant differences exist and all model(s) needs to be recalibrated? Because the final remedial system model simulations assumed no river fluctuations, observed levels can't be directly compared to simulated levels given the notable diurnal/seasonal river fluctuations and corresponding changes in groundwater levels. As such, why can't plans be to update and re-calibrate all models whenever changes to design/operations are proposed and then re-simulate future conditions to demonstrate long-term remedy performance still meets RAOs? Details on an approach/methodology for how the fate/transport model will be calibrated (for the first time) should be presented.	See above			Comment noted, however, this response doesn't seem to address concerns raised in the original comment. We continue to emphasize the need to a) fix and re-calibrate the model now; and b) update and re-calibrate the model when new datasets become available, not after all infrastructure has been installed and all data has become available. Key benefits to updating the model and then evaluating previous model predictions while data are being collected would be that any major deviations from what was expected could be addressed through 'adaptive management' adjustments in the design/operation BEFORE the entire system is installed. No details have been provided on exactly how the fate/transport model will be calibrated, calibration targets, allowable target tolerances etc. The Tribes highly recommend that this information be provided in the 90% BOD documentation to maintain a high level of transparency and confidence that the model(s) will be maintained at the highest level. This	DTSC/DOI response: Agencies will provide direction to PG&E in a separate letter.

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										would ensure the highest level of understanding of the system which would in turn provide confidence to Tribes when/if PG&E consultants determine that new design wells are required in sensitive Tribal areas. All Tribes should feel confident that the best available model predictions have been made. To date, while the model remains a critical design and operational tool, the model predictions are viewed as being highly uncertain.	
Specific Comments – 90% BOD, Appendix C: Design Criteria											
506	DOI-43	Design	Design	C.1/C-2	Codes and Standards	Since a number of the design features pertain to building roads and intrusive activities (e.g, installation of pipelines), there should be some text that refers to the interaction and criteria set forth by the Tribes.	[Intentionally left blank as the comment was withdrawn].		DOI withdraws the comment as this section deals specifically with codes and standards. This is addressed through other documents.		
507	DOI-44	Editorial	Editorial	C.1/C-11	References	Since the California Fire Codes; Mechanical Codes, Wind Codes are cited in the text but not provided in the reference list a web site address should be provided to these codes. Please also check to make sure all cited references are provided in the reference list (e.g., CBC(2010), CBC(2013))	Noted. Cited references will be added to the reference list (Section C.12). Codes will be added to the reference list, or a web site address will be provided.		Resolved.		Comment resolved pending DOI review of the final design documents..
508	FMIT/TRC	Design	Remedial Design	Append C: C.2.1	Attachment C: Geotechnical Analysis	The Units are indicated as International Feet. This should also indicate Horizontal Coordinate Units only. As appropriate, provide the scale factor for the grid to ground distance and coordinate conversion.	Section C.2.1 will be revised to clarify that horizontal coordinates are listed in International feet.			Comment noted.	
509	Hualapai/TRC	Design	Remedial Design	Append C: C.2.1	Attachment C: Geotechnical Analysis	The Units are indicated as International Feet. This should also indicate Horizontal Coordinate Units only. As appropriate, provide the scale factor for the grid to ground distance and coordinate conversion.	See above			Comment noted.	
510	Cocopah/TRC	Design	Remedial Design	Append C: C.2.1	Attachment C: Geotechnical Analysis	The Units are indicated as International Feet. This should also indicate Horizontal Coordinate Units only. As appropriate, provide the scale factor for the grid to ground distance and coordinate conversion.	See above			Comment noted.	
511	Chemehuevi/ TRC	Design	Remedial Design	Append C: C.2.1	Attachment C: Geotechnical Analysis	The Units are indicated as International Feet. This should also indicate Horizontal Coordinate Units only. As appropriate, provide the scale factor for the grid to ground distance and coordinate conversion.	See above			Comment noted.	
512	DOI-45	Design	Remedial Design	C.2.2/C-5	Pipes and conduit will be installed in steel casings when required by BNSF or ADOT…Geotechnical borings may be	Because there is no trenchless construction under the BNSF railroad, why are there references to BNSF requirements?	Reference to BNSF potentially requiring geotechnical borings will be removed from the text. BNSF may still require piping to be installed in steel carrier casings even if not installed using		Noted.		Comment resolved.

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					required by ADOT or BNSF		trenchless construction. If that is required, the text description for that feature will be copied to the section on below-ground piping.				
513	FMIT	Design	Infrastructures	Appendix D; C-5	CH2MHILL 90% Design Specifications	In C.2.2 Earthwork, design criteria states "at least 3 inches of clearance between directly buried water piping... and may be increased up to 12 inches". "Minimum spacing between directly buried electrical conduits shall be 3 inches or half the diameter of the conduit, whichever is greater." Many Civil design details fail to follow this specification.	The text is correct and drawings will be revised to be consistent. See also RTC #21 FMIT-7.			Resolved.	Resolved.
514	FMIT/TRC	Design	Infrastructures	Append. D	C-5	In C.2.2 Earthwork, design criteria states "at least 3 inches of clearance between directly buried water piping... and may be increased up to 12 inches". "Minimum spacing between directly buried electrical conduits shall be 3 inches or half the diameter of the conduit, whichever is greater." Many Civil design details fail to follow this specification.	The text is correct and drawings will be revised to be consistent. See also RTC #21 FMIT-7.			Comment noted.	
515	Hualapai/TRC	Design	Infrastructures	Append. D	C-5	In C.2.2 Earthwork, design criteria states "at least 3 inches of clearance between directly buried water piping... and may be increased up to 12 inches". "Minimum spacing between directly buried electrical conduits shall be 3 inches or half the diameter of the conduit, whichever is greater." Many Civil design details fail to follow this specification.	See above			Comment noted.	
516	Cocopah/TRC	Design	Infrastructures	Append. D	C-5	In C.2.2 Earthwork, design criteria states "at least 3 inches of clearance between directly buried water piping... and may be increased up to 12 inches". "Minimum spacing between directly buried electrical conduits shall be 3 inches or half the diameter of the conduit, whichever is greater." Many Civil design details fail to follow this specification.	See above			Comment noted.	
517	Chemehuevi/ TRC	Design	Infrastructures	Append. D	C-5	In C.2.2 Earthwork, design criteria states "at least 3 inches of clearance between directly buried water piping... and may be increased up to 12 inches". "Minimum spacing between directly buried electrical conduits shall be 3 inches or half the diameter of the conduit, whichever is greater." Many Civil design details fail to follow this specification.	See above			Comment noted.	
518	DOI-46	Design	Remedial Design	C.2.4/C-7	A perimeter fence will be installed along with a security camera to monitor and prevent unauthorized access.	Add a second bullet that indicates a gate with a lock or card reader will be installed.	Noted. Text will be revised to match C-01-01.		Accepted.		Comment resolved pending DOI review of the final design documents.
519	DOI-47	Design	Remedial Design	C.2.5/C-7	The vaults will vary in depth depending upon use and location, but to the extent possible they will be designed to be shallow enough that entry would not require a confined space entry procedure.	Suggest parenthetically adding four feet and citing the OSHA requirement.	The referenced text will be modified as follows: “The vaults will vary in depth depending upon use and location, but to the extent possible they will be designed to be shallow enough that entry would not require a confined space entry procedure (e.g., no greater than 4 feet in depth per OSHA’s Safety and Health Regulations for Construction §1926.21[b][6][ii]).”		Resolved.		Comment resolved.
520	DOI-48	Design	Other	C.4/C-11	4,000 psf for CH2M HILL-designed structures on the TCS; 2,000 psf for CH2M HILL designed structure	Please provide the basis for the specified criteria.	The listed design values are based on the geotechnical reports included as Attachment C to Appendix C. The referenced text in the design criteria will be revised to read: "4,000 psf for structures on the		Resolved.		Comment resolved.

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					outside the TCS		TCS; 2,000 psf for structures outside the TCS". As discussed in Section C.2 of Attachment C, to minimize intrusive field data collection during design, supplemental geotechnical data collection effort has been combined with the Soil RFI/RI investigation. As PG&E continues to engage in discussions with transportation agencies, counties, and other property owners/land managers to obtain institutional controls, access agreements, and permits, additional geotechnical data may be required to meet specific requirements of agencies and/or property owners/land managers. If determined to be required, the data will be collected during the construction phase.				
521	FMIT/TRC	Design	Other	Append C C.11 Noise	In this portion of Appendix C, the following text appears. C.11 Noise • The construction noise criteria will conform to San Bernardino Development Code and Mojave County standards, as well as the EIR mitigation measures NOISE-1, -2, and -3. Per San Bernardino County Code Division 3 Chapter 83.01.080, temporary construction, maintenance, repair, or demolition activities between 7:00	This paragraph provides noise-related criteria for the construction period(s) for the life of project. Therein, PG&E adopts the minimum required San Bernardino County noise criteria for facility construction and, in the absence of other clarification of modification, it certainly appears as though PG&E will be able to treat all remedy-related construction activities as EXEMPT FROM NOISE LIMITS during the stipulated hours and on the days stipulated. A higher noise standard should be voluntarily adopted for the project during construction, and that standard should be set in consultation with the impacted Tribes. If the above statement in C.11 Noise is at odds with what is elsewhere in project documents, it should be deleted.	Please see RTC #23 FMIT-9.			The Tribe requests further discussion of this comment.	DTSC Response: Comment noted. Noise impact evaluations are based on established regulatory thresholds. Noise impact is a resource area that DTSC will consider in the upcoming SEIR.

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					a.m. and 7:00 p.m., except Sundays and federal holidays, are exempt from noise limits.						
522	Hualapai/TRC	Design	Other	Append C C.11 Noise	In this portion of Appendix C, the following text appears. C.11 Noise • The construction noise criteria will conform to San Bernardino Development Code and Mojave County standards, as well as the EIR mitigation measures NOISE-1, -2, and -3. Per San Bernardino County Code Division 3 Chapter 83.01.080, temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays, are exempt from noise limits.	This paragraph provides noise-related criteria for the construction period(s) for the life of project. Therein, PG&E adopts the minimum required San Bernardino County noise criteria for facility construction and, in the absence of other clarification of modification, it certainly appears as though PG&E will be able to treat all remedy-related construction activities as EXEMPT FROM NOISE LIMITS during the stipulated hours and on the days stipulated. A higher noise standard should be voluntarily adopted for the project during construction, and that standard should be set in consultation with the impacted Tribes. If the above statement in C.11 Noise is at odds with what is elsewhere in project documents, it should be deleted.	See above				
523	Cocopah/TRC	Design	Other	Append C C.11 Noise	In this portion of Appendix C, the following text appears. C.11 Noise • The construction noise criteria will conform to San Bernardino Development Code and Mojave County standards, as well as the EIR mitigation measures	This paragraph provides noise-related criteria for the construction period(s) for the life of project. Therein, PG&E adopts the minimum required San Bernardino County noise criteria for facility construction and, in the absence of other clarification of modification, it certainly appears as though PG&E will be able to treat all remedy-related construction activities as EXEMPT FROM NOISE LIMITS during the stipulated hours and on the days stipulated. A higher noise standard should be voluntarily adopted for the project during construction, and that standard should be set in consultation with the impacted Tribes. If the above statement in C.11 Noise is at odds with what is elsewhere in project documents, it should be deleted.	See above				

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					NOISE-1, -2, and -3. Per San Bernardino County Code Division 3 Chapter 83.01.080, temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays, are exempt from noise limits.						
524	Chemehuevi/ TRC	Design	Other	Append C C.11 Noise	In this portion of Appendix C, the following text appears. C.11 Noise • The construction noise criteria will conform to San Bernardino Development Code and Mojave County standards, as well as the EIR mitigation measures NOISE-1, -2, and -3. Per San Bernardino County Code Division 3 Chapter 83.01.080, temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays, are exempt from noise limits.	This paragraph provides noise-related criteria for the construction period(s) for the life of project. Therein, PG&E adopts the minimum required San Bernardino County noise criteria for facility construction and, in the absence of other clarification of modification, it certainly appears as though PG&E will be able to treat all remedy-related construction activities as EXEMPT FROM NOISE LIMITS during the stipulated hours and on the days stipulated. A higher noise standard should be voluntarily adopted for the project during construction, and that standard should be set in consultation with the impacted Tribes. If the above statement in C.11 Noise is at odds with what is elsewhere in project documents, it should be deleted.	See above				
525	DOI-49	Design	Editorial	Attachment A p. 2 (of 7)	Carbon Substrate Selection	The discussion focuses on the factors that will be considered in the selection of the carbon substrate. Please include a discussion of the actual substrate that was selected for the injection.	A discussion of the selected carbon substrate (ethanol) will		Accepted.		Comment resolved pending DOI review of the final design

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							be added to this attachment.				documents.
526	DOI-50	Non-design	Editorial	Attachment A p. 6(of 7)	Dosing Design	This section makes a number of references to Appendix B of the 60% design report which should be updated to the Appendix B of the 90% design. Please also indicate where the dosing calculations are found in the 90% design report. Recommend including the dosing design calculations in Appendix B.	References will be updated and dosing calculations will be included in the final design.		Accepted.		Comment resolved pending DOI review of the final design documents..
527	DOI-51	Design	Editorial	Attachment A p. 7(of 7)	However, the amount of EVO required to achieve sufficient distribution can be up to an order of magnitude greater than the amount of oil retention reported in the literature, based on field implementation at a number of sites (Schnobrich et al., 2011). In practice, the required EVO loading must be evaluated on a case by-case basis to confirm the site-specific degree of droplet retention and to ensure sufficient organic carbon distribution for treatment within the targeted area.	Please provide a reference in the 90% design to where the site specific loading rates are calculated that factor in the droplet retention. Recommend including the loading rate calculations in Appendix B.	See also RTC #526 DOI-50. The following references that discuss the retention of oil droplets for EVO distribution will be included in the final design: Solutions-IES, 2006. Protocol for Enhanced In Situ Bioremediation Using Emulsified Edible Oils. Environmental Security Technology Certification Program, Arlington, Virginia. (www.estcp.org) Soo H. and C.J. Radke, 1984. The flow mechanism of dilute stable emulsions in porous media. Ind. Eng. Chem. Fundam., 23: 342-347. Soo H. and C.J. Radke, 1986. A filtration model for the flow of dilute stable emulsions in porous media – I. Theory. Chem. Eng. Sci., 41: 263:272. It should be noted that, in ARCADIS's experience, the EVO requirement calculated based on oil retention typically underestimates the amount of oil needed for adequate distribution/to overcome the electron acceptors present. The final design will include the method to calculate the amount of EVO needed for distribution based on oil retention while acknowledging the potential need for injection of higher amounts of EVO based		Resolved.		Comment resolved.

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							on past experience.				
528	DOI-52	Design	Editorial	Attachment B p. 71	Calculation Cover Sheet	According to the QA Cover Sheet the calculations for the caustic feed usage that were revised on 4/4/2013 have not been independently checked.	Calculations included in Appendix C have been updated where required. In many cases the calculations serve to size vessels and quantify approximate anticipated quantities of reagent use and as such do not require independent verification. Calculations are revised when needed based on engineering judgment. The actual use of chemicals may vary during operations and is difficult to fully predict during the design stage.		Resolved.		Comment resolved.
529	DOI-53	Design	Editorial	Attachment C/Section C.1 p.C-1	The purpose of this geotechnical summary is to provide information on existing site geology and geotechnical data in support of the groundwater remedy design and to propose areas where supplemental geotechnical investigation is needed to verify design parameters.	Since this is the 90% design, please indicate when this work will be completed.	Coordination with the Soil RFI/RI investigation program was conducted in planning of the supplemental geotechnical investigation to minimize the number of boreholes, thereby minimizing ground disturbance. Specific areas are proposed in Section C.2 of Attachment C (Geotechnical Analysis) to Appendix C (Design Criteria). Due to the limited amount of geotechnical data available at the time of this design, assumptions made during the design will be reviewed after receipt of supplemental geotechnical data, currently planned to be collected as part of the forthcoming Soil RFI/RI sampling effort (anticipated in Fall 2015). Any material changes to the design required by this supplemental information will be discussed with the agencies. It is important to note that as PG&E continues to engage in discussions with transportation agencies,		Resolved.		Comment resolved.

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							counties, and other property owners/land managers to obtain institutional controls, access agreements, and permits, additional geotechnical data may be required to meet specific requirements of agencies and/or property owners/land managers.				
530	DOI-54	Design	Editorial	Attachment C/Section C.1 p.C-1	(Full report presented in PDF format as part of this Attachment to Appendix C of the 60% Basis of Design Report on the Appendix C CD ROM).	Reference to 60% Design report needs to be changed to 90% Design and report needs to be attached to this Appendix C.	Reference to the 60% Design will be deleted. The 2004 geotechnical report was attached to Attachment C.		Resolved.		Comment resolved.
531	DOI-55	Design	Editorial	Attachment C/Section C.1.2 p.C-4	Complete results of the 2009 investigation can be found in the 2009 *Geotechnical Investigation, Topock AOC 4 Remediation – Pre Work Plan Data Collection Activities* report, which is included as part of this Attachment to Appendix C on the Appendix C CD ROM.	Unless the WP is going to be included as part of Appendix C, please modify this sentence. There are a number of more instances where attachments are referred to but not included presumably because they were originally attached to the 60% design report but not the 90% design.	The 2009 geotechnical report was attached to Attachment C.		Resolved.		Comment resolved.
532	DOI-56	Non-design	Editorial	Attachment D/Section 1 p. 1(of 5)	DESIGN BULLETIN: Remediation Well Design and Field Construction Approach	Since this is a very general discussion references to the SOPs (where applicable) should be made.	Cross-references to the Construction/Remedial Action Work Plan and/or Standard Operating Procedures will be included as applicable.		Accepted.		Comment resolved pending DOI review of the final design documents.
533	DOI-57	Non-design	Editorial	Attachment D/Section 2 p. 1(of 5)	Therefore, the screened intervals proposed for the remediation wells as shown on Table 3.2.1-1 of the 60% design document are preliminary,	This section needs to be updated to the 90% Design document.	References to the 60% design document will be updated as appropriate.		Accepted.		Comment resolved pending DOI review of the final design documents.

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Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					and are based in part on the total vertical thickness of the unconsolidated sediments that are saturated.						
534	DOI-58	Non-design	Editorial	Attachment D/Section 2 p. 1(of 5)	Remediation Well Design General Plan	Should mention whether well material will be PVC (sch. 60 or 80) and how the wells will be completed at the surface – stickup or flush mount.	Details regarding well material and surface completion are included in Section 3.2 of the BOD. References to this section will be added to Section 2 of Attachment D.		Accepted.		Comment resolved pending DOI review of the final design documents.
535	DOI-59	Non-design	SOPs	Attachment D/Section 2 p. 5 (of 5)	Typically it is recommended that turbidity and potentially other field parameters such as conductivity and pH are measured in the extracted fluids during well development to assess progress.	Should revise to indicate that well is generally considered developed when parameters stabilize and meet pre-determined stabilization criteria.	Details regarding well development, including criteria for determining whether a well is developed, are provided in Section 3.2.1 of the Construction/Remedial Action Work Plan (C/RAWP). A reference to the C/RAWP will be added to Attachment D.		Accepted.		Comment resolved pending DOI review of the final design documents.
536	DTSC-120	Design	Remedial design	Appendix C, Attachment D, Section 2	"the screened intervals proposed for the remediation wells as shown on Table 3.2.1-1 of the 60% design document…"	Where is Table 3.2.1-1? Possible typographical error. Is actual reference supposed to be Table 3.2-1?	The reference will be updated to Table 3.2-1 of the 90% design document.	Resolved.			Comment resolved.
537	DOI-60	Non-design	Editorial	Attachment E/Section 1 p. 1	In the areas where as-built information was not available, piping routes were hypothesized based on logical assumptions. If more as-build information becomes available, then the analysis can be refined.	This analysis references the 60% Design for obtaining pipe lengths and elevations, and it is not clear whether the calculations need to be been updated to the 90% Design.	The 90% design did not require significant changes from the 60% design for anticipated fire water use. Therefore the calculations were not updated. However, the attachment will refer to the "final" design in the final design submittal.		Resolved.		Comment resolved.
Specific Comments – 90% BOD, Appendix D: Plans (Engineering Drawings)											

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538	FMIT/TRC	Design	Infrastructures	Append D Table D1-13	Table Heading / Explanation	The table heading/explanation should identify whether these are the items in the new infrastructure that are expected to be the major potential sources of environmental noise, or whether this a subset of such major sources, and how the subset was defined or otherwise determined.	This clarification was obtained from the commenter on April 22, 2015: "What I am looking for is some statement/narrative from the preparers of Table D1-13 that the equipment itemized in the table are those items felt, by the preparers/designers, to be the significant above-ground sources of sound power levels (SPLs) generated by the project during its operation." Response to clarified comment: The levels stated in Table D1-13 are the Sound Pressure Levels (SPLs) that would be expected when measured at the specified distance. They are different from Sound Power Levels (PWL or Lw) which are calculated quantities that are not directly measured. While the preparers/ designers do not find these sound levels to be either substantial or significant, this list summarizes the primary aboveground, non-emergency, remedy equipment that is likely to be a source of audible sound during operation.		Response noted.	Noted.	
539	Hualapai/TRC	Design	Infrastructures	Append D Table D1-13	Table Heading / Explanation	The table heading/explanation should identify whether these are the items in the new infrastructure that are expected to be the major potential sources of environmental noise, or whether this a subset of such major sources, and how the subset was defined or otherwise determined.	See above		See above		
540	Cocopah/TRC	Design	Infrastructures	Append D Table D1-13	Table Heading / Explanation	The table heading/explanation should identify whether these are the items in the new infrastructure that are expected to be the major potential sources of environmental noise, or whether this a subset of such major sources, and how the subset was defined or otherwise determined.	See above		See above		
541	Chemehuevi/ TRC	Design	Infrastructures	Append D Table D1-13	Table Heading / Explanation	The table heading/explanation should identify whether these are the items in the new infrastructure that are expected to be the major potential sources of environmental noise, or whether this a subset of such major sources, and how the subset was defined or otherwise determined.	See above		See above		
542	DTSC-121	Design	Remedial Design	Appendix D, Drawing C-00-05, Detail 6	"To be added later"	Why is the termination of pipeline B detail not included in design? What is meant by later? When will PG&E provide this detail?	The connections at the bridge terminations of pipeline B will be added once negotiations for access agreement have been completed.				
543	FMIT/TRC	Design	Infrastructures	Append D	Sheet M-00-05	The table in this drawing indicates that (horizontal) coordinates and elevations for wells will be provided as the design advances. The design is nearly complete, and these data should be provided	Preliminary well coordinates are			Comment noted.	

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						as part of the 90% RTC process, with a specific estimated location, along with a +/- estimate for each well location.	provided in tables 3.2-1 through 3.2-4. Final well coordinates will be provided after installation and survey of the final well locations.				
544	Hualapai/TRC	Design	Infrastructures	Append D	Sheet M-00-05	The table in this drawing indicates that (horizontal) coordinates and elevations for wells will be provided as the design advances. The design is nearly complete, and these data should be provided as part of the 90% RTC process, with a specific estimated location, along with a +/- estimate for each well location.	See above			Comment noted.	
545	Cocopah/TRC	Design	Infrastructures	Append D	Sheet M-00-05	The table in this drawing indicates that (horizontal) coordinates and elevations for wells will be provided as the design advances. The design is nearly complete, and these data should be provided as part of the 90% RTC process, with a specific estimated location, along with a +/- estimate for each well location.	See above			Comment noted.	
546	Chemehuevi/ TRC	Design	Infrastructures	Append D	Sheet M-00-05	The table in this drawing indicates that (horizontal) coordinates and elevations for wells will be provided as the design advances. The design is nearly complete, and these data should be provided as part of the 90% RTC process, with a specific estimated location, along with a +/- estimate for each well location.	See above			Comment noted.	
547	JDS	Design	Remedial Design	Appendix D; Figure E-00-08		Recommend installing well FW-1 in the access road, eliminate 90 elbows to create off-set, eliminate need to relocate existing underground IM-3 pipeline	FW-1 was placed in its current location to facilitate construction, decommissioning of IM-3 and long-term O&M.			Noted.	
548	JDS	Design	Remedial Design	Appendix D: Figure C-07-23		Provide spec for vertical separation between existing IM-3 piping and full-scale pipe and conduit. Horizontal spacing provided in the notes but not the vertical spacing.	Specifying the vertical separation of IM-3 and remedy piping is not necessary except in the locations where the pipes cross. Remedy pipelines and trenches are to be installed at the depths shown, where ever piping crosses; vertical distances between the piping will be included in the final design drawings.			Noted.	
549	FMIT	Design	Infrastructures	Appendix D; C-07-100, C-07-101, C-07-102, C-07-103	CH2MHILL 90% Design Plans	There appears to be an inconsistent application of the pipe and conduit spacing in the pipe cross sections from the engineering specification. This inconsistent spacing typically results in a wider trench than appears to be necessary. Trench width may be reduced if minimum design spacing of 3-inches between water pipes or sum of half the diameters for pipelines or electrical conduit are used, in some cases up to 1 foot may be eliminated. Optimizing the trenches may result in significant reduction in the volume of excavated materials. Details A2 and A5 have concrete encasement width of 2-feet, while A6 has a 1'-6" encasement. Concrete encasement for 12 kV line varies from 1'-6" to 2'-9". Varying red concrete cap widths, some details cover all electrical conduits, while others do not. Detail A3 has electrical conduits within the 12 inch min. spacing, not protected by a concrete cap, or detection tape. Why is there a 12" min between concrete trench and electrical conduit? Multiple details show a 12" minimum spacing between water pipes, concrete, and various objects (i.e. concrete, electrical pipes, concrete trench for example). Spacing between water lines inconsistent, for example Section H1 depicts 9-inches of spacing between water lines, while Section A10 spacing ranges between 4 and 6 inches between water lines. Narrower trenches are preferred by FMIT. Spacing between conduits should be reexamined for example in Section A8 the space between 2-inch conduits is 6 inches, while in other sections the spacing is 3 inches. A final example is the width of Section H2 is narrower than Section H1. These trenches should contain the same water lines and conduits but vary in width. It should be noted that Section H1, a	See RTC #21 FMIT-7.			Noted.	

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						lateral to one IRL well is only 5-inches narrower than Section A10 the trunk line to Pipeline Segment A.					
550	FMIT/TRC	Design	Infrastructures	Append. D	C-07-100,101, 102,103	There appears to be an inconsistent application of the pipe and conduit spacing in the pipe cross sections from the engineering specification. This inconsistent spacing typically results in a wider trench than appears to be necessary. Trench width may be reduced if minimum design spacing of 3-inches between water pipes or sum of half the diameters for pipelines or electrical conduit are used, in some cases up to 1 foot may be eliminated. Optimizing the trenches may result in significant reduction in the volume of excavated materials. Details A2 and A5 have concrete encasement width of 2-feet, while A6 has a 1'-6" encasement. Concrete encasement for 12 kV line varies from 1'-6" to 2'-9". Varying red concrete cap widths, some details cover all electrical conduits, while others do not. Detail A3 has electrical conduits within the 12 inch min. spacing, not protected by a concrete cap, or detection tape. Why is there a 12" min between concrete trench and electrical conduit? Multiple details show a 12" minimum spacing between water pipes, concrete, and various objects (i.e. concrete, electrical pipes, concrete trench for example). Spacing between water lines inconsistent, for example Section H1 depicts 9-inches of spacing between water lines, while Section A10 spacing ranges between 4 and 6 inches between water lines. Narrower trenches are preferred by FMIT. Spacing between conduits should be reexamined for example in Section A8 the space between 2-inch conduits is 6 inches, while in other sections the spacing is 3 inches. A final example is the width of Section H2 is narrower than Section H1. These trenches should contain the same water lines and conduits but vary in width. It should be noted that Section H1, a lateral to one IRL well is only 5-inches narrower than Section A10 the trunk line to Pipeline Segment A. Please refer to the attached markup of the figure titled "Pipeline Sections" as an example.	See RTC #21 FMIT-7.			Noted.	
551	Hualapai/TRC	Design	Infrastructures	Append. D	C-07-100,101, 102,103	There appears to be an inconsistent application of the pipe and conduit spacing in the pipe cross sections from the engineering specification. This inconsistent spacing typically results in a wider trench than appears to be necessary. Trench width may be reduced if minimum design spacing of 3-inches between water pipes or sum of half the diameters for pipelines or electrical conduit are used, in some cases up to 1 foot may be eliminated. Optimizing the trenches may result in significant reduction in the volume of excavated materials. Details A2 and A5 have concrete encasement width of 2-feet, while A6 has a 1'-6" encasement. Concrete encasement for 12 kV line varies from 1'-6" to 2'-9". Varying red concrete cap widths, some details cover all electrical conduits, while others do not. Detail A3 has electrical conduits within the 12 inch min. spacing, not protected by a concrete cap, or detection tape. Why is there a 12" min between concrete trench and electrical conduit? Multiple details show a 12" minimum spacing between water pipes, concrete, and various objects (i.e. concrete, electrical pipes, concrete trench for example). Spacing between water lines inconsistent, for example Section H1 depicts 9-inches of spacing between water lines, while Section A10 spacing ranges between 4 and 6 inches between water lines. Narrower trenches are preferred by FMIT. Spacing between conduits should be reexamined for example in Section A8 the space between 2-inch conduits is 6 inches, while in other sections the spacing is 3 inches. A final example is the width of Section H2 is narrower than Section H1. These trenches should contain the same water lines and conduits but vary in width. It should be noted that Section H1, a lateral to one IRL well is only 5-inches narrower than Section A10 the trunk line to Pipeline Segment A. Please refer to the attached markup of the figure titled "Pipeline Sections" as an example.	See above				
552	Cocopah/TRC	Design	Infrastructures	Append. D	C-07-100,101, 102,103	There appears to be an inconsistent application of the pipe and conduit spacing in the pipe cross sections from the engineering specification. This inconsistent spacing typically results in a wider trench than appears to be necessary. Trench width may be reduced if minimum design spacing of 3-inches between water pipes or sum of half the diameters for pipelines or electrical conduit are used, in some cases up to 1 foot may be eliminated. Optimizing the trenches may result in significant reduction in the volume of excavated materials. Details A2 and A5 have concrete encasement width of 2-feet, while A6 has a 1'-6" encasement. Concrete encasement for 12 kV line varies from 1'-6" to 2'-9". Varying red concrete cap widths, some details cover all electrical conduits, while others do not.	See above				

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						Detail A3 has electrical conduits within the 12 inch min. spacing, not protected by a concrete cap, or detection tape. Why is there a 12" min between concrete trench and electrical conduit? Multiple details show a 12" minimum spacing between water pipes, concrete, and various objects (i.e. concrete, electrical pipes, concrete trench for example). Spacing between water lines inconsistent, for example Section H1 depicts 9-inches of spacing between water lines, while Section A10 spacing ranges between 4 and 6 inches between water lines. Narrower trenches are preferred by FMIT. Spacing between conduits should be reexamined for example in Section A8 the space between 2-inch conduits is 6 inches, while in other sections the spacing is 3 inches. A final example is the width of Section H2 is narrower than Section H1. These trenches should contain the same water lines and conduits but vary in width. It should be noted that Section H1, a lateral to one IRL well is only 5-inches narrower than Section A10 the trunk line to Pipeline Segment A. Please refer to the attached markup of the figure titled "Pipeline Sections" as an example.					
553	Chemehuevi/ TRC	Design	Infrastructures	Append. D	C-07-100,101, 102,103	There appears to be an inconsistent application of the pipe and conduit spacing in the pipe cross sections from the engineering specification. This inconsistent spacing typically results in a wider trench than appears to be necessary. Trench width may be reduced if minimum design spacing of 3-inches between water pipes or sum of half the diameters for pipelines or electrical conduit are used, in some cases up to 1 foot may be eliminated. Optimizing the trenches may result in significant reduction in the volume of excavated materials. Details A2 and A5 have concrete encasement width of 2-feet, while A6 has a 1'-6" encasement. Concrete encasement for 12 kV line varies from 1'-6" to 2'-9". Varying red concrete cap widths, some details cover all electrical conduits, while others do not. Detail A3 has electrical conduits within the 12 inch min. spacing, not protected by a concrete cap, or detection tape. Why is there a 12" min between concrete trench and electrical conduit? Multiple details show a 12" minimum spacing between water pipes, concrete, and various objects (i.e. concrete, electrical pipes, concrete trench for example). Spacing between water lines inconsistent, for example Section H1 depicts 9-inches of spacing between water lines, while Section A10 spacing ranges between 4 and 6 inches between water lines. Narrower trenches are preferred by FMIT. Spacing between conduits should be reexamined for example in Section A8 the space between 2-inch conduits is 6 inches, while in other sections the spacing is 3 inches. A final example is the width of Section H2 is narrower than Section H1. These trenches should contain the same water lines and conduits but vary in width. It should be noted that Section H1, a lateral to one IRL well is only 5-inches narrower than Section A10 the trunk line to Pipeline Segment A. Please refer to the attached markup of the figure titled "Pipeline Sections" as an example.	See above				
554	FMIT	Design	Infrastructures	Appendix D; C-07-105, C-07-106	CH2MHILL 90% Design Plans	Why is there 12" spacing between electric conduit and water pipelines in underground trenches on previous sheets, but less than 12" spacing in the open air concrete trench? If power and water are so close together in the concrete trench, why is there so much spacing for water lines in concrete trenches and direct bury electrical conduits?	The 12" horizontal/ vertical spacing between conduits and water lines is an engineering approach selected with consideration for future operations and maintenance. By separating the lines, we can excavate and repair/inspect the water lines without needing to move the electrical lines that are installed closer to the surface out of the way. The spacing is reduced in the concrete trenches where the lines can be accessed without excavating around each.			Noted.	
555	FMIT/TRC	Design	Infrastructures	Append. D	C-07-106	Why is there 12" spacing between electric conduit and water pipelines in underground trenches on previous sheets, but less than 12" spacing in the open air concrete trench? If power and water are	See RTC #554 FMIT.			Noted.	

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						so close together in the concrete trench, why is there so much spacing for water lines in concrete trenches and direct bury electrical conduits?					
556	Hualapai/TRC	Design	Infrastructures	Append. D	C-07-106	Why is there 12" spacing between electric conduit and water pipelines in underground trenches on previous sheets, but less than 12" spacing in the open air concrete trench? If power and water are so close together in the concrete trench, why is there so much spacing for water lines in concrete trenches and direct bury electrical conduits?	See above				
557	Cocopah/TRC	Design	Infrastructures	Append. D	C-07-106	Why is there 12" spacing between electric conduit and water pipelines in underground trenches on previous sheets, but less than 12" spacing in the open air concrete trench? If power and water are so close together in the concrete trench, why is there so much spacing for water lines in concrete trenches and direct bury electrical conduits?	See above				
558	Chemehuevi/ TRC	Design	Infrastructures	Append. D	C-07-106	Why is there 12" spacing between electric conduit and water pipelines in underground trenches on previous sheets, but less than 12" spacing in the open air concrete trench? If power and water are so close together in the concrete trench, why is there so much spacing for water lines in concrete trenches and direct bury electrical conduits?	See above				
559	FMIT	Design	Infrastructures	Appendix D; C-07-107	CH2MHILL 90% Design Plans	Why is there 2' of spacing between two separate trenches for water and power lines? Detail L3 and K1 show 480V electrical lines within 12" of water lines.	See RTC #21 FMIT-7.				
560	FMIT/TRC	Design	Remedial Design	Append D AND Supplemental Section 3	Design group "09" Compressor Station Ponds	There appears to have been no effort made to estimate the CUMULATIVE noise impacts resulting from this, or other major segments (e.g., TCS improvements) of this project. This is important considering both the duration of the build-out, and the long-term operation of the remedy. The approach appears to be to design and construct, and then see if complaints arise, and if there are complaints, to then attempt to deal with the issues. Instead, the designers should quantify in advance the projected cumulative noise level impacts resulting from planned improvements at such locations. As an illustration, for the TCS evaporation ponds segment of the project, partial sound level information is provided in Appendix D, Equipment List D1-12 for the natural gas generator that will power the facility.	Certain TCS improvements, such as the new air compressor building, are not part of the project. Improvements to the ponds, however, are part of the project. The cumulative noise analysis for the project can be found on page 6-38 of Volume 2 of the EIR. The analysis accounts for the possibility that the project may be constructed at the same time as unrelated projects at the compressor station, as well as noise from I-40, the railroad, and other existing noise sources in the area. According to this analysis, the project will not make a cumulatively considerable contribution to cumulative noise impacts if the project complies with Mitigation Measures NOISE-1, NOISE-2, and NOISE-3. The approach for this project is to comply with the applicable regulatory standards that are set to protect certain resources and/or receptors and implement the mitigation measures specified in the EIR. The County's noise standards	DTSC has considered cumulative impacts of all known projects in the Certified EIR. Noise impacts are evaluated against regulatory thresholds. DTSC understands that culturally, Tribes may consider noise differently than regulatory thresholds, thus DTSC evaluated the potential cultural impacts of the project and considers it significant and unavoidable.		Now that the design is close to 100% complete, the Subsequent Groundwater EIR should include a comprehensive cumulative noise impact evaluation that considers the project as it now exists, because the project has changed in important ways. Therefore, this comment is considered unresolved.	DTSC Response: Comment noted. Noise impact and cumulative impact are subject areas that DTSC will consider in the upcoming SEIR.

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						However, NO sound level data are provided for the two 3-HP pontoon-mounted pumps that will be installed and operational in each of two lagoons to provide aeration of pond waters. Further there is no analysis or evaluation of noise levels from the aeration/emitter sub-system installed along the top edges of the ponds. This approach to individual equipment items provides no analysis or evaluation of the potential cumulative noise impact that can be anticipated at various locations from the planned facility improvements. The cumulative impacts under consideration here get at the impacts to the larger cultural landscape. It is important not only to quantify the noise impacts, but to provide mitigation of those impacts, especially at this remote location. In the interest of further noise attenuation at the remote pond location, the designers should consider a Cummins Quiet Connect Series RS 30 generator (or equivalent), which offers improved noise attenuation (as compared to the Cummins GGMC R.I.C.E. model) – when specified to include the available sound-attenuating enclosure. This approach, in conjunction with planned placement in the structure, may offer significantly reduced sound levels at the site.	and the EIR mitigation measures limit the amount of noise allowed to be produced. These thresholds are numerical and quantifiable (see Section C.11 of Appendix C). These numerical standards are supplemented by protocols specified in the CIMP to further reduce auditory impacts. These design criteria avoid the need to have to quantify the project's contribution to cumulative noise impacts by ensuring that the project's contribution to cumulative noise will be the same as disclosed in the EIR. Further, the type of equipment proposed is consistent with that assumed in the EIR, indicating that additional mitigation above and beyond what has already been specified is not required. The noise emitted by the two 3-HP pontoon mounted pumps (one pump per pond) satisfy the noise design criteria. Details are provided below. The pontoon pumps utilize totally enclosed fan-cooled (TEFC) 3 Hp motors. The sound pressure level for a standard 3 Hp motor at loaded conditions is predicted to be 60 dB at a distance of 9 meters. The minimum distance from the proposed location of the pontoon mounted pumps to the fence line is approximately 20 meters, therefore a standard motor will be expected to be 54 dB at the fence line. This complies with the applicable noise requirements for the				

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							TCS Evaporation Ponds. In addition, the above calculations are based on standard motors. Higher efficiency motors are being utilized which are quieter than standard motors. In the unlikely event that actual noise levels exceed the criterion of 60 dB at the fence line, additional engineering controls will be installed to achieve compliance. The commenter noted that RICE generator sets may be specified with sound attenuating enclosure. These enclosures provide additional insulation and sound suppression to attenuate sound. Several manufacturers (Cummins, Kohler, Generac) produce natural gas fueled RICE generator sets that meet the noise design criteria at the ponds. PG&E recently learned that Cummins no longer produces the GGMC model. Therefore, we evaluated other models from Cummins and other manufacturers; Cummins RS30, Kohler 30REZG and Generac SGO35. All models, when specified with sound enclosures, will meet the noise design criteria at TCS ponds. In addition to the enclosure, the generator will be housed in a utility building which further attenuate sound levels. The Kohler Model 30REZG was selected because of its certified Prime rating. A Prime rating allows the operational flexibility (in terms of allowed operating hours in a year) needed for the				

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							enhanced evaporation system at the ponds. The Generac SGO35 and Cummins RS30 only have a standby rating, limits the number of hours they can operate and are therefore not viable options. As noted above, generator will be outfitted with an enclosure and located inside a building.				
561	Hualapai/TRC	Design	Remedial Design	Append D AND Supplemental Section 3	Design group "09" Compressor Station Ponds	There appears to have been no effort made to estimate the CUMULATIVE noise impacts resulting from this, or other major segments (e.g., TCS improvements) of this project. This is important considering both the duration of the build-out, and the long-term operation of the remedy. The approach appears to be to design and construct, and then see if complaints arise, and if there are complaints, to then attempt to deal with the issues. Instead, the designers should quantify in advance the projected cumulative noise level impacts resulting from planned improvements at such locations. As an illustration, for the TCS evaporation ponds segment of the project, partial sound level information is provided in Appendix D, Equipment List D1-12 for the natural gas generator that will power the facility. However, NO sound level data are provided for the two 3-HP pontoon-mounted pumps that will be installed and operational in each of two lagoons to provide aeration of pond waters. Further there is no analysis or evaluation of noise levels from the aeration/emitter sub-system installed along the top edges of the ponds. This approach to individual equipment items provides no analysis or evaluation of the potential cumulative noise impact that can be anticipated at various locations from the planned facility improvements. The cumulative impacts under consideration here get at the impacts to the larger cultural landscape. It is important not only to quantify the noise impacts, but to provide mitigation of those impacts, especially at this remote location. In the interest of further noise attenuation at the remote pond location, the designers should consider a Cummins Quiet Connect Series RS 30 generator (or equivalent), which offers improved noise attenuation (as compared to the Cummins GGMC R.I.C.E. model) – when specified to include the available sound-attenuating enclosure. This approach, in conjunction with planned placement in the structure, may offer significantly reduced sound levels at the site.	See above			Now that the design is close to 100% complete, the Subsequent EIR should include a comprehensive cumulative noise impact evaluation that considers the project as it now exists, because the 2011 EIR did not address this, and the project has changed in important ways. Therefore, this comment is considered unresolved.	DTSC response: Tribal comment noted, see RTC #560
562	Cocopah/TRC	Design	Remedial Design	Append D AND Supplemental Section 3	Design group "09" Compressor Station Ponds	There appears to have been no effort made to estimate the CUMULATIVE noise impacts resulting from this, or other major segments (e.g., TCS improvements) of this project. This is important considering both the duration of the build-out, and the long-term operation of the remedy. The approach appears to be to design and construct, and then see if complaints arise, and if there are complaints, to then attempt to deal with the issues. Instead, the designers should quantify in advance the projected cumulative noise level impacts resulting from planned improvements at such locations. As an illustration, for the TCS evaporation ponds segment of the project, partial sound level information is provided in Appendix D, Equipment List D1-12 for the natural gas generator that will power the facility. However, NO sound level data are provided for the two 3-HP pontoon-mounted pumps that will be installed and operational in each of two lagoons to provide aeration of pond waters. Further there is no analysis or evaluation of noise levels from the aeration/emitter sub-system installed along the top edges of the ponds. This approach to individual equipment items provides no analysis or evaluation of the potential cumulative noise impact that can be anticipated at various locations from the planned facility improvements. The cumulative impacts under consideration here get at the impacts to the larger cultural landscape. It is important not only to quantify the noise impacts, but to provide mitigation of those impacts, especially at this remote location. In the interest of further noise attenuation at the remote pond location, the designers should consider a Cummins Quiet Connect Series RS 30 generator (or equivalent), which offers improved noise attenuation (as compared to the Cummins GGMC R.I.C.E. model) – when specified to include the available sound-attenuating enclosure. This approach, in conjunction with planned placement in the structure, may offer significantly reduced	See above			Now that the design is close to 100% complete, the Subsequent EIR should include a comprehensive cumulative noise impact evaluation that considers the project as it now exists, because the 2011 EIR did not address this, and the project has changed in important ways. Therefore, this comment is considered unresolved.	DTSC response: Tribal comment noted, see RTC #560

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						sound levels at the site.					
563	Chemehuevi/ TRC	Design	Remedial Design	Append D AND Supplemental Section 3	Design group "09" Compressor Station Ponds	There appears to have been no effort made to estimate the CUMULATIVE noise impacts resulting from this, or other major segments (e.g., TCS improvements) of this project. This is important considering both the duration of the build-out, and the long-term operation of the remedy. The approach appears to be to design and construct, and then see if complaints arise, and if there are complaints, to then attempt to deal with the issues. Instead, the designers should quantify in advance the projected cumulative noise level impacts resulting from planned improvements at such locations. As an illustration, for the TCS evaporation ponds segment of the project, partial sound level information is provided in Appendix D, Equipment List D1-12 for the natural gas generator that will power the facility. However, NO sound level data are provided for the two 3-HP pontoon-mounted pumps that will be installed and operational in each of two lagoons to provide aeration of pond waters. Further there is no analysis or evaluation of noise levels from the aeration/emitter sub-system installed along the top edges of the ponds. This approach to individual equipment items provides no analysis or evaluation of the potential cumulative noise impact that can be anticipated at various locations from the planned facility improvements. The cumulative impacts under consideration here get at the impacts to the larger cultural landscape. It is important not only to quantify the noise impacts, but to provide mitigation of those impacts, especially at this remote location. In the interest of further noise attenuation at the remote pond location, the designers should consider a Cummins Quiet Connect Series RS 30 generator (or equivalent), which offers improved noise attenuation (as compared to the Cummins GGMC R.I.C.E. model) – when specified to include the available sound-attenuating enclosure. This approach, in conjunction with planned placement in the structure, may offer significantly reduced sound levels at the site.	See above			Now that the design is close to 100% complete, the Subsequent EIR should include a comprehensive cumulative noise impact evaluation that considers the project as it now exists, because the 2011 EIR did not address this, and the project has changed in important ways. Therefore, this comment is considered unresolved.	DTSC response: Tribal comment noted, see RTC #560
Specific Comments – 90% BOD, Appendix E: Specifications											
564	FMIT/TRC	Non-design	Infrastructures	Append E	N/A	Criteria for as-built vertical location precision and datum for all project wells heads (or other portions of wells used for referencing well water levels) should be provided as part of the project specifications. Suggested criteria may be developed with consideration for CSA S250-11 and CI/ASCE 38-02. These standards should also be considered for all surveying (horizontal and vertical) completed to provide as-built (record) information for all underground infrastructure on the project.	As mentioned in RTCs #52 FMIT/TRC, #53 Hualapai/TRC, #54 Cocopah/TRC, and #55 Chemehuevi/TRC, PG&E anticipates establishing temporary survey control points in various locations at the project site to use during and post-construction. Section C.2.1 of Appendix C lists the project vertical and horizontal datum. The surveying control points will be included in the as-built drawings.	PG&E is required to submit a set of "as-built" along with a construction completion report. This information can be made a part of that final report which would include any exceptions to the final design.		Noted awaiting information called for in DTSC response.	PG&E will provide information on the survey control points in the Construction Completion Report required under the 1996 Corrective Action Consent Agreement.
565	Hualapai/TRC	Non-design	Infrastructures	Append E	N/A	Criteria for as-built vertical location precision and datum for all project wells heads (or other portions of wells used for referencing well water levels) should be provided as part of the project specifications. Suggested criteria may be developed with consideration for CSA S250-11 and CI/ASCE 38-02. These standards should also be considered for all surveying (horizontal and vertical) completed to provide as-built (record) information for all underground infrastructure on the project.	See above				
566	Cocopah/TRC	Non-design	Infrastructures	Append E	N/A	Criteria for as-built vertical location precision and datum for all project wells heads (or other portions of wells used for referencing well water levels) should be provided as part of the project specifications. Suggested criteria may be developed with consideration for CSA S250-11 and CI/ASCE 38-02. These standards should also be considered for all surveying (horizontal and vertical) completed to provide as-built (record) information for all underground infrastructure on the project.	See above				
567	Chemehuevi/ TRC	Non-design	Infrastructures	Append E	N/A	Criteria for as-built vertical location precision and datum for all project wells heads (or other portions of wells used for referencing well water levels) should be provided as part of the project specifications. Suggested criteria may be developed with consideration for CSA S250-11 and CI/ASCE 38-02. These standards should also be considered for all surveying (horizontal and vertical)	See above				

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						completed to provide as-built (record) information for all underground infrastructure on the project.					
568	FMIT/TRC RTC, 60% 457a	Design	Infrastructures	Append E 03 30 00 p. 16	(orig comment #457 response) *"PG&E agrees to provide pigment information to the tribe, if requested when it becomes available."*	It is requested that if and when this information becomes available, it be provided to the Tribes.	The requested information is anticipated to become available during construction. When it is, the information can be distributed with other construction data.			Response noted. This comment will be considered unresolved until such time as this information is provided.	PG&E shall provide the pigment information to the Tribes when it is available during construction.
569	Hualapai /TRC RTC, 60% 457a	Design	Infrastructures	Append E 03 30 00 p. 16	(orig comment #457 response) *"PG&E agrees to provide pigment information to the tribe, if requested when it becomes available."*	It is requested that if and when this information becomes available, it be provided to the Tribes.	See above			Response noted. This comment will be considered unresolved until such time as this information is provided	See response to RTC #568
570	Cocopah/TRC RTC, 60% 457a	Design	Infrastructures	Append E 03 30 00 p. 16	(orig comment #457 response) *"PG&E agrees to provide pigment information to the tribe, if requested when it becomes available."*	It is requested that if and when this information becomes available, it be provided to the Tribes.	See above			Response noted. This comment will be considered unresolved until such time as this information is provided	See response to RTC #568
571	Chemehuevi/ TRC RTC, 60% 457a	Design	Infrastructures	Append E 03 30 00 p. 16	(orig comment #457 response) *"PG&E agrees to provide pigment information to the tribe, if requested when it becomes available."*	It is requested that if and when this information becomes available, it be provided to the Tribes.	See above			Response noted. This comment will be considered unresolved until such time as this information is provided	See response to RTC #568
Specific Comments – 90% BOD, Appendix F: Remedy Wastewater Management Technical Memorandum											
572	DOI-61	Design	Process	Table F-5/F-12	Excess capacity of the ponds is estimated to be between 500,000 and 1,000,000 gallons per year.	Does this estimate consider provisions to enhance evaporation as noted in the adjacent column pertaining to infrastructure requirements? Please clarify.	No, it does not. Over the most recent five-year period (2010-2014), the annual flows to the ponds have ranged from 3.7 to 7.5 million gallons (MGs). With an estimated total pond capacity of 5 MGs, there are times where there could be up to 1.4 MG excess capacity and there are times where there is no excess		Resolved.		Comment resolved.

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							capacity (and as a last resort, wastewater may need to be trucked offsite).				
573	DOI-62	Non-design	Editorial	Table F-5 note/F-13	If PG&E proposes to evaluate this option…	"This" should be "either" or the text should reference a specific option.	The word "this" will be replaced by "either".		Resolved.		Comment resolved.
574	FMIT/TRC RTC, 60% 490	Choose an item.	Choose an item.	Append F Table F-5 p. F-13	Regarding possible infiltration gallery in Bat Cave Wash: (orig. comment #490 response): …." *PG&E proposes to evaluate this option further in the future, PG&E will discuss the option at that time, and will seek further input from the Tribes during the Soil CMS/FS development and review. Text will be added to the 90% BOD to reflect this response.*"	The Tribes appreciate that this option is no longer under consideration. The Tribes would prefer that this option be eliminated completely but understand the commitment that : "*If PG&E proposes to evaluate this option further in the future, PG&E will discuss this option with agencies and Tribes at that time.*" If any such project were to be added later, it would undergo public environmental review.	Comment noted.		Comment noted.	Response noted and comment considered resolved.	Comment resolved.
575	Hualapai/TRC RTC, 60% 490	Choose an item.	Choose an item.	Append F Table F-5 p. F-13	Regarding possible infiltration gallery in Bat Cave Wash: (orig. comment #490 response): …." *PG&E proposes to evaluate this option further in the future, PG&E will discuss the option at that time, and will seek further input from the Tribes during the Soil CMS/FS development and review. Text will be added to the 90% BOD to reflect this response.*"	The Tribes appreciate that this option is no longer under consideration. The Tribes would prefer that this option be eliminated completely but understand the commitment that : "*If PG&E proposes to evaluate this option further in the future, PG&E will discuss this option with agencies and Tribes at that time.*" If any such project were to be added later, it would undergo public environmental review.	See above		See above	Response noted and comment considered resolved.	Comment resolved.

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576	Cocopah/TRC RTC, 60% 490	Choose an item.	Choose an item.	Append F Table F-5 p. F-13	Regarding possible infiltration gallery in Bat Cave Wash: (orig. comment #490 response): ....” *PG&E proposes to evaluate this option further in the future, PG&E will discuss the option at that time, and will seek further input from the Tribes during the Soil CMS/FS development and review. Text will be added to the 90% BOD to reflect this response.*”	The Tribes appreciate that this option is no longer under consideration. The Tribes would prefer that this option be eliminated completely but understand the commitment that : “*If PG&E proposes to evaluate this option further in the future, PG&E will discuss this option with agencies and Tribes at that time.*” If any such project were to be added later, it would undergo public environmental review.	See above		See above	Response noted and comment considered resolved.	Comment resolved.
577	Chemehuevi/ TRC RTC, 60% 490	Choose an item.	Choose an item.	Append F Table F-5 p. F-13	Regarding possible infiltration gallery in Bat Cave Wash: (orig. comment #490 response): ....” *PG&E proposes to evaluate this option further in the future, PG&E will discuss the option at that time, and will seek further input from the Tribes during the Soil CMS/FS development and review. Text will be added to the 90% BOD to reflect this response.*”	The Tribes appreciate that this option is no longer under consideration. The Tribes would prefer that this option be eliminated completely but understand the commitment that : “*If PG&E proposes to evaluate this option further in the future, PG&E will discuss this option with agencies and Tribes at that time.*” If any such project were to be added later, it would undergo public environmental review.	See above		See above	Response noted and comment considered resolved.	Comment resolved.
578	DOI-63	Design	Editorial	Table F-6/F-15	Third column	This table is the first occurrence of A-side and B-side references. There needs to be an explanatory footnote.	A footnote will be added to explain that: “To allow for operational flexibility to segregate/manage various produced water streams and to optimize processes in the future,		Resolved.		Comment resolved.

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							the conditioning system will be configured with two parallel trains: 1) A-side Remedy and 2) B-side Freshwater. Both trains will be equipped initially with identical processes/units as illustrated in Figure F-2.”				
579	DOI-64	Design	Editorial	Table F-6/F-15	First note at the bottom of the table	The acronym FWPTS needs to be defined and explained in this appendix.	The acronym FWPTS will be defined and its purpose explained in the first note.		Accepted.		Comment resolved pending DOI review of the final design documents.
580	DOI-65	Design	Other	Figure F-2/F-17	N/A	There needs to be a note added to the figure indicating there will be parallel A-side and B-side systems.	Addition of note will be made as requested.		Accepted.		Comment resolved pending DOI review of the final design documents..
581	DOI-66	Design	Editorial	Figure F-2/F-17	N/A	The placement of the DMRS in the process train would be helpful. It would have a dashed box and the footnote 1 above would reference Figure F-2.	Placement of the DMRS in Figure F-2 will be made as requested.		Accepted.		Comment resolved pending DOI review of the final design documents.
Specific Comments – 90% BOD, Appendix G: Evaluation of Arched Bridge Structural Integrity and Space Availability to Support Freshwater Supply Pipeline											
582	FMIT/TRC RTC, 60% 466a	Non-design	Infrastructures	Append G	(orig comment #457 response) …*”Any follow-on pipeline bridge improvement project will be a Gas Transmission project. Consistent with current practice, PG&E will keep the agencies, stakeholders, and Tribes informed of Gas Transmission projects in the Topock area.” (emphasis added)*	The Tribes appreciate PG&E’s commitment to keeping the Tribes informed of any new, ongoing gas transmission projects.	Comment noted.		Comment noted.	Response noted and comment considered resolved.	Comment resolved.
583	Hualapai/TRC RTC, 60% 466a	Non-design	Infrastructures	Append G	(orig comment #457 response) …*”Any follow-on pipeline bridge improvement project will be a Gas Transmission project. Consistent with current practice, PG&E will keep the agencies,*	The Tribes appreciate PG&E’s commitment to keeping the Tribes informed of any new, ongoing gas transmission projects.	See above		See above	Response noted and comment considered resolved.	Comment resolved.

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					stakeholders, and Tribes informed of Gas Transmission projects in the Topock area." (emphasis added)						
584	Cocopah/TRC RTC, 60% 466a	Non-design	Infrastructures	Append G	(orig comment #457 response) …*"Any follow-on pipeline bridge improvement project will be a Gas Transmission project. Consistent with current practice, PG&E will keep the agencies, stakeholders, and Tribes informed of Gas Transmission projects in the Topock area." (emphasis added)*	The Tribes appreciate PG&E's commitment to keeping the Tribes informed of any new, ongoing gas transmission projects.	See above		See above	Response noted and comment considered resolved.	Comment resolved.
585	Chemehuevi/ TRC RTC, 60% 466a	Non-design	Infrastructures	Append G	(orig comment #457 response) …*"Any follow-on pipeline bridge improvement project will be a Gas Transmission project. Consistent with current practice, PG&E will keep the agencies, stakeholders, and Tribes informed of Gas Transmission projects in the Topock area." (emphasis added)*	The Tribes appreciate PG&E's commitment to keeping the Tribes informed of any new, ongoing gas transmission projects.	See above		See above	Response noted and comment considered resolved.	Comment resolved.
Specific Comments – 90% BOD, Appendix I: Response to Comments											
586	FMIT	Non-design	CEQA/EIR	Appendix I; RTC Item 536		This comment was carried through to the 90%, but it is still not clear as to how/ whether the CEQA process will apply to design changes.		DTSC has committed to evaluate in the final		Noted. And pending further information.	

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								SEIR whether the design changes have new significant impacts from those in the certified 2011 FEIR or increase the severity of the impacts disclosed in that document. DTSC will not complete and certify the SEIR prior to completion of the 90% design response to comments.			
Specific Comments – 90% BOD, Appendix L: O&M Manual – Main Text											
587	DOI-67	Non-design	Editorial	L1/L1-1	A Remedial Design/Remedial Action Consent Decree (CD) between the United States and PG&E, on behalf of the DOI, under CERCLA (DOI 2013) was approved by the United States District Court for the Central District of California in November 2013.	For clarity, please revise this sentence to read: A Remedial Design/Remedial Action Consent Decree (CD) between the United States, on behalf of the DOI, and PG&E, (DOI 2013) was approved by the United States District Court for the Central District of California in November 2013.	Revision will be made as requested.		Accepted.		Comment resolved pending DOI review of the final design documents.
588	MWD	Non-design	Request for Information	Main Text, Sect. L1.1.1/L1-3	"...groundwater remedy becomes OF either one year after construction is complete, or when groundwater remedy is determined concurrently by DOI and DTSC to be functioning properly, whichever is earlier. DOI may grant extensions to the one-year period..."	Provide clarification on whether DTSC would also honor possible extensions, beyond the one year time-frame, for determining the project to be Operational and Functional (OF).	The text will be revised as follows: "...groundwater remedy becomes OF either one year after construction is complete, or when groundwater remedy is determined ~~concurrently~~ by DOI ~~and DTSC~~ to be functioning properly, whichever is earlier. DOI may grant extensions to the one-year period..." Revisions to this sentence will be made throughout the document.	See RTC #96 FMIT-19.	See RTC #96 FMIT-19.		Comment resolved.
589	DOI-68	Non-design	Remedial	Appendix L,	3. Performance	The performance summary should include an evaluation of the hydraulic capture of the plume by	The following text will		Resolved.		Comment resolved.

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			Design	L.2.2. p. L2-10	Summary	the extraction wells near the Colorado River.	be added to Exhibit L2.2-2 of the O&M Manual (added text shown as underline): "**3. Performance Summary** Describe monitoring events and sampling performed during the current reporting period, the sampling results and interpretation of results (including volume of water collected and treated, Cr(VI) mass treated, influent-effluent data, etc.), <u>an evaluation of the hydraulic control of the plume</u>, an interpretation of progress toward RAOs, and any material deviations from design documents, O&M Manual, and Construction/Remedial Action Work Plan (e.g., gaps or inconsistencies in the site conceptual model)."				
590	DOI-69	Non-design	O&M	Appendix L, L.2.2. p. L2-10	6. Recommendations	Another section should be added that discusses whether or not recommendations from the previous quarter were adopted and if not, why not.	PG&E suggests that the requested discussion, if applicable, be included in the same section 6, but under its own subheading such as "Status of recommendations from previous quarter". The following text will added to Section 6: "**6. Recommendations** Provide suggestions for system optimizations or procedural enhancements, as applicable, to improve performance, reduce costs, reduce wastes, etc. Optimizations and/or enhancements could be based on system inefficiencies, technological developments, modified regulations, etc. <u>If applicable, discuss whether or not recommendations from</u>		Resolved.		Comment resolved.

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							the previous quarter were adopted and if not, why not."				
591	DOI-70	Non-design	O&M	Appendix L, L.3.1. p. L3-1	…entered into a spreadsheet and/or database periodically.	The onsite lab data should be entered into a central database preferably the same database as the field data and off-site lab data.	As depicted on Exhibit L3.1-1, onsite laboratory data (after QC) will be stored in a database. This is likely the same database or data warehouse that store the validated lab data and field data for use by the project team. Section L3.1 text will be revised as follows (added text shown in underline): "**Onsite Laboratory Data (second paragraph)** The onsite lab data will be recorded in a bench log book and entered into a spreadsheet and/or database periodically. Although the onsite data will not be validated using the same procedures as the offsite lab data, they will be reviewed; anomalous results will be identified and reviewed and, if needed, reanalyzed at the direction of the project chemist. After QC, data will be stored in a database for use by project team. Onsite laboratory samples will periodically be analyzed in conjunction with offsite analysis, and the data will be reviewed/compared for quality and accuracy."		Resolved.		Comment resolved.
592	DOI-71	Non-design	O&M	Appendix L, L.3.1. p. L3-1	Offsite Laboratory Data	There is no mention of the offsite laboratory data being entered into a database. Since electronic reporting requirements placed on laboratories are common it is not clear why the offsite lab data would not be electronically entered in a database to facilitate retrieval.	As depicted on Exhibit L3.1-1, offsite laboratory data will be entered into a database for validation, and then validated data will be stored in a database for use by project team (e.g., analyze data, prepare report tables). Section L3.1 text will be revised as follows (added text shown in underline): "**Offsite Laboratory Data**		Resolved.		Comment resolved.

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							The data flow (electronic and hard copy) from offsite laboratory to the project chemist is tracked to ensure that the data are reviewed and validated in a timely manner. The project chemist will discuss and resolve technical issues, if any, with the laboratory. <u>Electronic data will be entered into a database where they undergo QC checks before being validated. Validated data will be stored in a database for use by project team.</u> The laboratory will maintain electronic and hardcopy records sufficient to re-create each analytical event…”				
593	DOI-72	Non-design	O&M	Appendix L, L.3.1. p. L3-3	Maintenance/ Calibration Records	Although the subsection is titled Maintenance/Calibration there is no mention of calibration records.	In the context of this subsection, preventative maintenance includes calibration. Therefore, the word “Calibration” will be removed from the title of the subsection.		Resolved.		Comment resolved.
Specific Comments – 90% BOD, Appendix L: O&M Manual -- Volume 1: O&M Plan											
594	DTSC-139	Design	Editorial	Section 2.1.1.1, p2-2	Each NTH IRZ Extraction Well will include a sample port upstream of the point where groundwater from that well exits the vault	The text should be revised to note sample ports are included for each screened interval of the extraction well, as shown on I-04-02.	The text will be revised as follows: “Each NTH IRZ Extraction Well screened interval will include a sample port upstream of the point where groundwater from that ~~well~~ screened interval exits the vault.”	Resolved.			Comment resolved.
595	DTSC-140	Non-design	Editorial	Section 2.1.1.3, p2-3	The storage tank will include the following, as shown in Appendix A, Drawing M-06-04	Drawing M-06-04 is not included in App A of vol. 1 as stated.	The referenced drawing (IRZ Carbon Substrate Storage Tank Mechanical Details) will be copied from Appendix D of the BOD report and included in Appendix A of O&M Manual Volume 1 for the final design.	Resolved.			Comment resolved.
596	DTSC-141	Design	Infrastructures	Section 2.1.1.3 p2-3	An integral overfill prevention device, attached to the tank fill line, designed to	In reviewing drawings I-06-02 and M-06-04 for the MW-20 carbon substrate tank, it appears the external connections for the fill line and vapor recovery line are in close proximity and use the same dry-break quick connect fittings. The fill line is equipped with overfill protection but the vapor recovery line is not. Modifications to the design should be made to ensure the tank can only be filled through the fill line (e.g. different fitting on the vapor recovery line, similar to that at the TWB carbon substrate tank). If this is already the case, the drawings should be revised for clarification.	The ethanol tank piping network is designed and constructed by the manufacturer to comply with applicable codes and requirements, including San Bernardino	Resolved.			Comment resolved.

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					prevent filling of the tank beyond 90 percent of the rated capacity		Fire Marshall and MDAQMD requirements, which may dictate the specifications for these connections. The option of installing different types of fittings to minimize potential to connect to the wrong line will be considered with the manufacturer. The lines connected to the tank will also be identified with labels as appropriate. The text will be updated accordingly in the final design.				
597	DOI-73	Non-design	O&M	2.1.1.3: p. 2-3	Carbon Amendment System	Many of the carbon substrates experience phase separation and need to be stirred prior to dosing – if this is potentially an issue the system needs to have a means for this to occur. Often times a recirculating pump is placed in the holding tank.	The carbon amendment system is currently designed for the use of ethanol as the carbon substrate, which will not require mixing. Use of other reagents may require minor modifications to the piping network, tank, valves, fittings, or pumps, depending on the alternative reagent.		Accepted.		Comment resolved.
598	DOI-74	Design	O&M	2.1.1.3: p. 2-3	Carbon Amendment System	There should be some discussion about the frequency and means that the meters are calibrated since they can be affected by different backpressures.	In our control engineers' experience varying backpressures do not significantly affect the error in measurement using magnetic flow meters. Meter calibration will be checked and recalibrated as needed or as often as recommended by the manufacturer.		Resolved.		Comment resolved.
599	DOI-75	Non-design	O&M	2.1.1.3: p. 2-3	Carbon Amendment System	Please specify the range of anticipated dosing rates.	As listed in 90% BOD Exhibit 3.2-1, the MW-20 Bench carbon amendment system is designed based on a target nominal dosing rate of 100 gallons/day TOC and a potential maximum of up to 700 gallons/day TOC.		DOI concurs with the response.		Comment resolved.
600	DTSC-142	Design	Infrastructures	Section 2.1.1.3 p2-4	A vapor recovery system designed to capture any emissions generated during the	We could not find a description of this system or details regarding its operation and maintenance. See comment related comment below also.	The vapor recovery system is an integral component of the carbon substrate storage tank and is not detailed separately. The vapor recovery system design and O&M requirements	Resolved.			Comment resolved.

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					storage tank filling process		will be specified by the manufacturer to match the tank size and flow rates required, and will comply with applicable codes and requirements including San Bernardino Fire Marshall and MDAQMD requirements. System maintenance requirements will be further detailed in the tank ATC permit and inspections are anticipated to be performed, at minimum, during annual certification and testing processes.				
601	DOI-76	Non-design	O&M	2.2/2-8	A schematic of the freshwater supply system is shown in Exhibit 2.2-1.	The paragraph should discuss the contingent arsenic treatment system since it is shown on Exhibit 2.2-1.	Since the contingent arsenic treatment system is discussed in the Contingency Plan (Volume 3), a reference to Volume 3 will be added to Exhibit 2.2-1.		Resolved.		Comment resolved.
602	DOI-77	Non-design	O&M	2.2.1.2/2-10	The new 12-inch-diameter pipeline will cross the Colorado River to California via the Arched Bridge.	The text should describe the pipeline route from HNWR-1A to the Arched Bridge noting that it follows the county road, is underground, and crosses under the railroad track at the existing railroad overpass (trenchless technology not required).	The cited text will be expanded to read as follows: "The new 12-inch-diameter pipeline will <u>follow the county road (underground), cross under the railroad overpass (trenchless technology not required), cross under I-40 (trenchless technology required), and</u> cross the Colorado River to California via the Arched Bridge."		Resolved.		Comment resolved.
603	DOI-78	Design	O&M	2.2.1.2/2-10	Midway along the PG&E Line 300A gas pipeline maintenance road, the freshwater pipeline will branch to the north (i.e., Pipeline J) to connect to the piping corridor located near National Trails Highway and the Compressor Station access	If pre-treatment is required for arsenic removal, this branch could not be used. What is the contingent piping plan to get freshwater to IRL-1 through IRL-4 and FW-1 should treatment be required for freshwater? Such contingent piping is not shown on G-00-08.	Please see RTC #296 FMIT/TRC, #297 Hualapai/TRC, #298 Cocopah/TRC, and #299 Chemehuevi/TRC. The text of O&M Manual Volume 1 Section 2.2.1.2 will be revised to be consistent with RTC #296.		Accepted		Comment resolved pending DOI review of the final design documents.

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					road.						
604	DOI-79	Design	Remedial Design	2.2.3.3/2-11	Freshwater Injection Wells FW-01 and FW-02 are designed to receive up to 200 and 100 gpm, respectively, under gravity flow from the remedy freshwater storage tank (TNK-103) (see Table 2.2-1). Freshwater Injection Well FW-01 receives fresh water directly from the freshwater supply wells and FW-02 receives fresh water from the remedy freshwater storage tank.	FW-01 does not receive gravity flow from TNK-103, as indicated in the second sentence. Please clarify.	FW-01 is capable of receiving gravity flow from TNK-103 by the nature of water flow in the piping system. It does not, however, receive primary flow of freshwater by nature of gravity flow from TNK-103 under normal operating conditions. The referenced text will be revised for clarity.		Accepted pending final review.		Comment resolved pending DOI review of the final design documents.
605	DOI-80	Non-design	O&M	2.3: p. 2-12	They include monitoring well sampling purge water..	Please add monitoring well sampling <u>and development </u>purge water	The suggested edit will be incorporated.		Resolved.		Comment resolved.
606	DOI-81	Non-design	Editorial	2..5: p. 2-18	Remedy SCADA	Should mention if there is a backup power system.	Secondary (backup) power supply is available from photovoltaic solar panels or backup generators as described in Section 2.4 of the O&M Plan (O&M Manual, Volume 1). In addition, an uninterruptible power supply (UPS) is provided for key equipment such as control systems. This information will be added to the first paragraph of Section 2.4.		Resolved.		Comment resolved pending DOI review of the final design documents.
607	DOI-82	Non-design	O&M	2.7.1.1: p. 2-19	Components	Since the water in the TCS Evaporation Ponds may have a high TDS there should be a leak detection system. Please provide a description of the construction of the ponds within this section.	PG&E proposes to include the following text after the first paragraph at the beginning of Section 2.7: "<u>By design, discharge to the TCS ponds is and will continue to be fully</u>		Resolved.		Comment resolved.

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							contained, thereby designed to prevent any leaks. In layers (from top to bottom), each pond has a new 60-mil high-density polyethylene (HDPE) top liner; the original 60-mil HDPE primary liner (with repairs); a leachate collection and removal system (LCRS); and a secondary 40-mil HDPE liner underlain by 2 feet of low-permeability clay. The LCRS functions as an early warning system to prevent leaks by enabling a determination of whether the top liner system has been compromised, prior to a potential release of pond water to the environment. In addition, the area immediately adjacent to the TCS ponds lysimeters were installed underneath the clay base, and seven groundwater monitoring wells were installed to detect leaks. The groundwater and vadose zone monitoring systems are sufficient to allow detection of any potential before any discharge reaches groundwater (groundwater is between approximately 160 and 190 feet below the bottoms of the ponds, as noted earlier)."				
608	DTSC-143	Design	Remedial Design	Section 3.1.1.2 p3-2	At the injection well valve vaults, the Inner Recirculation Loop and freshwater forcemains connect to the smaller diameter injection well piping	Consideration should be given to installing check valves near this connection to prevent inadvertent transfer between the freshwater and IRL forcemains should manual valves be left open.	Check valves will be added to the injection well vaults in the final design.	Resolved.			Comment resolved.
609	DTSC-144	Design	Infrastructures	Section 3.1.1.2 p3-2		A description of the vapor recovery systems in the carbon substrate tanks should be added here along with a discussion on operation. A discussion on maintenance of these systems should be included in section 3.1.5. An SOP should be added to Appendix B and details should be included in	See response to Comment #600 (DTSC-142). As additional	Resolved.			Comment resolved.

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						the mechanical and P&ID drawings as appropriate.	details become available from the manufacturer during the project construction phase, they will be incorporated into the as-builts, O&M Manual, and SOPs, as appropriate. As mentioned in RTC #600 DTSC-142, the vapor recovery system is an integral component of the carbon substrate storage tank and is not detailed separately. The vapor recovery system design and O&M requirements will be specified by the manufacturer to match the tank size and flow rates required, and will comply with applicable codes and requirements including San Bernardino Fire Marshall and MDAQMD requirements. System maintenance requirements will be further detailed in the tank ATC permit and inspections are anticipated to be performed, at minimum, during annual certification and testing processes. As additional details become available from the manufacturer during the construction phase, this information will be incorporated into the as-builts, O&M Manual, and SOPs, etc. Material changes to the SOPs and O&M Manual such as incorporation of the above vapor recovery system will be reported in the progress reports and posted on the SharePoint site for access by agencies, Tribes, and stakeholders.				
610	DOI-83	Design	O&M	3.1.1 p. 3-3	As detailed in the Sampling and Monitoring Plan in Volume 2 of this O&M Manual, carbon substrate	As noted in the text, the carbon substrate amendment concentrations will be determined from monitoring data but the rationale behind the actual dosing rates, frequency and duration needs to be presented somewhere in the O&M manual.	The injected concentration is the main dosing control that will be adjusted, i.e. if not enough carbon is distributed; a higher concentration will be		Resolved.		Comment resolved.

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					amendment concentrations, frequency, and duration will be adjusted based on analytical groundwater data and injection well performance data.		added such that a higher concentration will remain after substrate degrades during distribution in the subsurface. The dosing parameter of frequency may also need to be adjusted to maintain injection capacity. For example, water levels tend to increase during ethanol dosing and decrease following injections. As injected concentration changes, a different frequency of injection may be needed to accommodate the water level changes associated with ethanol injection and maintain injection capacity. The duration of the injection will be adjusted to control the total amount of ethanol being injected. For example, it may be advantageous to store more reducing equivalents within the aquifer, while not changing how far the ethanol is distributed by changing the injection concentration. In this example, the footprint of byproduct generation could be held constant while increasing the stored Cr(VI) reducing capacity while the IRZ is ON. The following text explaining the interplay between concentration, frequency, and duration of injections will be added to the text in the O&M Manual, Volume 2 on page 2-1 to add further detail to this section where adjustments of dosing are discussed: "The injected concentration is the main dosing control that will be adjusted to improve distribution. Frequency may also need to be adjusted to				

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							maintain injection capacity. The duration of the injection will be adjusted to control the total amount of ethanol being injected."				
611	DOI-84	Design	O&M	3.1.3.1 p. 3-6	Continuous or intermittent injection or dosing of the selected carbon substrate, carbon substrate target total organic carbon (TOC) concentrations, and injection frequency and duration will be adjusted based on groundwater analytical data and injection well performance, as summarized in Section 2.1.1.4 and presented in the Sampling and monitoring Plan in Volume 2 of this O&M Manual.	The discussion pertaining to using the monitoring data to establish and optimize dosing rates really does not fit in the "Sampling and Monitoring Plan". The dosing uses the data from the monitoring but has more to do with the operation of the system. Recommend moving the discussion about the dosing to Vol 1.	The most appropriate location for the explanation of how groundwater monitoring data will be used to guide dosing parameters is somewhat subjective. For the 60% Design, the data quality objectives used to guide design of the monitoring program were presented in the Sampling and Monitoring Plan. These data quality objectives, which were requested by the agencies, include decision rules that, in the case of this program, provide the framework for how data will be used to make operational decisions. As such, the operational decision framework based on groundwater monitoring data was presented in the Sampling and Monitoring Plan. For consistency, we would like to retain the operational decision framework for dosing in the Sampling and Monitoring Plan along with the rest of the operational decision frameworks that are part of the data quality objectives.		DOI concurs with the response.		Comment resolved.
612	DOI-85	Non-design	Editorial	3.2.1.2/3-15	Fresh water stored in the Remedy Freshwater Storage Tank (TNK-103) will flow by gravity to the freshwater injection well FW-02 (P&IDs I-02-01 and I-02-02).	On I-02-01, freshwater is coming in as portrayed on I-02-01. The reference should be I-01-01. Also, freshwater is shown going to the future freshwater pre-injection treatment system on I-02-03. The referenced drawing does not exist. Also, on drawing I-01-01, freshwater flows to the freshwater storage tank on I-02-02. The reference should be I-02-01.	Sheet references will be corrected for the 100% submittal. Note that references to I-02-03 (Freshwater Pre-Injection Treatment System) should be updated to I-13-01.		Resolved.		Comment resolved.
613	DOI-86	Design	O&M	3.2.1.2/3-15	TNK-103 level above the low-	Why would water levels below low-level set points prevent operation of the freshwater supply well? Please explain.	The bullet in question will be revised to read: •		Accepted.		Comment resolved.

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					level set point (LSL-155) A given injection well must have water level greater than the low-level set point (LT-052)		A given injection well must have water level less than the high-level set point (LT-052).				
614	DOI-87	Non-design	Editorial	3.2.1.2/3-15	Backwash pump (PMP-001) is not in RUN mode Well head pressure is below the high-pressure set point (PI/PIT-062)	These conditions should be prefaced with "A given injection well vault…"	The referenced bullets will be revised as follows: • Backwash pump in a given injection well (PMP-001) is not in RUN mode • Well head pressure is below the high-pressure set point in a given injection well (PI/PIT-062)		Resolved.		Comment resolved.
615	DOI-88	Design	O&M	3.2.1.2/3-16	TNK-103 outlet valve (V-103C) – Open	This valve could be closed if FW-02 was being backwashed. This would allow flow to the other injection wells and the filling of T-103.	Under normal operating conditions V-FWST-103C will always remain open. Actuated valve FV-FW-02-011 at FW-02 will close during the automated backwash sequence.		Resolved.		Comment resolved.
616	DTSC-145	Design	Infrastructures	Section 3.5 3-71		The SCADA system should include offsite backup of the information stored in Historian.	The Historian database, SCADA/HMI programs and PLC logic programs will be backed up off-site to support system continuity and access to data.				
617	DOI-89	Design	O&M	4.1.1.1 p. 4-2 Notes in Table 4.1.1	water level data will be collected from each well and will be used to calculate the specific capacity and specific injectivity once the well is in service	It can often be difficult collecting accurate water levels from pumping and injection wells due to the interference from the pump wires and water spray. Recommend completing the wells with a 1-inch stilling well inside the casing – basically the way water levels were collected before transducers were common.	Stilling wells are part of the existing remediation well design. Please see the well design drawings in Appendix D of the BOD for further details (M-02-02, M-03-01 to M-03-02, M-04-01 to M-04-02, and M-05-01 to M-05-03). Transducers will be installed in the stilling wells to allow for automated water level data collection. The stilling wells will also allow for manual measurement of water levels in the remediation wells.		Accepted.		Comment resolved.
618	DOI-90	Design	O&M	4.1.1.4 p. 4-3	The two baseline samples will be collected	It would seem that the best baseline data would come a week or two after pumping is initiated. Otherwise the water in the vicinity of the well may not have recovered to ambient geochemical conditions due to the introduction of water during drilling etc.	Agreed. We will confirm that we are close to steady state conditions prior to sampling.		Resolved.		Comment resolved.

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					approximately one month apart; however, the time between samples might be shortened if determined necessary to ensure that the collection of these samples doesn't delay startup of the system.		Collection of the samples should not affect operations, so they can be collected at any time.				
619	DOI-91	Design	O&M	4.1.1.4 p. 4-4	Reduction-Oxidation Potential	Please make sure that the electrode method described by the USGS for determining Reduction-Oxidation potential is really necessary. This can be a very tricky test to complete in the field and generally a multicomponent probe is used to determine ORP which can be corrected to eH.	The suggested change will be made. A multi component probe will be used to measure ORP which will then be corrected to eH.		Resolved.		Comment resolved pending DOI review of the final design documents.
620	FMIT	Non-design	Process	Appendix L, p. 4-6	Combined Comments Received from : DOI, DTSC, FMIT, and TRC, Operation and Maintenance Manual September 2014	Tribes believe Absolute Comment Nos. 20, and 24 have not been adequately addressed.	Page 4-6 of Appendix L in the September 2014 90% submittal contains the last paragraph of Section 4.1.2.1 (Well Capacity Monitoring), Sections 4.1.2.2 (Wellhead Inspection and Field Parameter Testing), and the first paragraph of Section 4.2 (Well Maintenance). A cross reference to comments on those sections in the 60% RTC Table point to the following RTCs: 1. #592 DOI-236 2. #593 FMIT-167, Hualapai-121, CRIT-121, Cocopah-121, Chemehuevi-121 3. #594 DOI-237 4. #595 DTSC-176 5. #596 FMIT-168 If this is not fully responsive, please provide additional information on which comments the commenter is referring to and specifically which aspect of the comment has not been adequately addressed.			Noted.	
621	DTSC-146	Design	Contingencies	Operation and Maintenance Manual Volume 1	"Monitoring well maintenance, including	Specific SOPs pertinent to monitoring well maintenance should be listed in this section. A well head inspection checklist developed for the existing Topock wells should be referenced. Specific criteria/triggers related to well redevelopment should be cited including: acceptable turbidity levels, measuring depth to bottom of well casing to assess excessive siltation, and tracking sampling	Specific SOPs associated with monitoring well maintenance will be referenced in this	Resolved.			Comment resolved.

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				4.2.4 Monitoring Well Acceptance Page 4-24	wellhead repair or well screen re-development, will be performed on an as-needed basis as deficiencies are identified. For example, if the well does not yield groundwater samples that meet the sample collection criteria identified in the appropriate SOP (e.g., sustained turbidity above the given criteria), then re-development should be conducted.”	purge rates/drawdown over time. DTSC requests that slug tests also be conducted periodically in monitoring wells to evaluate if the initial development was successful as well as to assess if redevelopment is needed in the future.	section. The well inspection checklist developed and reported as part of the routine Topock groundwater monitoring program (Well-SOP-09) will also be added the referenced section for routine application during groundwater remedy operation. As requested, the following specific criteria have been developed and will be added to the referenced section: • Turbidity measurements will be tracked in monitoring wells during routine sampling events. When the final, stabilized turbidity measurement collected during well sampling is consistently measured in the range of approximately 20-30 NTU additional evaluation will be conducted to determine if the well should be re-developed. This evaluation will include review of relevant information including past development records, water quality and hydraulic measurements collected during sampling events, and hydraulic data collected from well testing or longer-term pressure transducer measurement. As re-development events are evaluated and				

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							performed the results will be used to determine if monitoring well re-development should be performed on a more or less frequent basis. • Measurement (SOP-A11, Total Depth Measurements) of infill (siltation) at a depth that corresponds to the bottom of or within the screened interval will trigger re-development. It should be noted that if the well was constructed with a sump (as opposed to a standard threaded cap at the bottom of the well) re-development may be required to remove thicknesses of sediment that collect below the well screen. • Specific capacity measurements will be tracked over time and compared against the baseline measurements and from event-to-event. Decrease in the specific capacity of a monitoring well that precludes groundwater sample collection in compliance with SOP-A18 (minimal drawdown method) will be re-developed. For wells that are sampled in accordance with				

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							SOP-A1 (well-volume method) re-development will be triggered when the specific capacity drops below 70% of the baseline measurement (at the flow rate used for sampling). See response to RTC # 971 DTSC-175 regarding the collection of specific capacity data in monitoring wells.				
622	DOI-92	Design	O&M	4.2.5 p. 4-25	Exhibit 4.2-9	The report should also include a section for monitoring well performance.	A new section will be inserted after existing item 3 (Injection Well Performance) for Monitoring Well Performance with the following outline: 4 Monitoring Well Performance 4.1 Problems Encountered 4.2 Testing and Sampling Table 4-1 Monitoring Well Water Levels, Purging Events, and Specific Capacities Table 4-2 Monitoring Well Inspection Results		Accepted.		Comment resolved pending DOI review of the final design documents.
623	DOI-93	Non-design	Editorial	6.1.3.1/6-4	The conditioning plant is not designed for treatment of RCRA and non-RCRA hazardous waste.	Also indicate that the TCS evaporation ponds cannot take RCRA or non-RCRA hazardous wastes. A discussion should also be added regarding which waste streams may be RCRA or non-RCRA hazardous waste due to the presence of dissolved chromium or arsenic. Exhibit 6.1-2 implies that some waste may be RCRA or non-RCRA hazardous waste because of pH or leaching of metals from suspended solids – thus the plan for pH adjustment and/or filtering.	The following text will be added to the end of the first paragraph in Section 6.1.3.1. "<u>Only non-hazardous waste will be sent to the TCS evaporation ponds. Certain waste streams generated by the remedy (e.g., first flush wastewater from well rehabilitation or purge water from certain monitoring wells) may exhibit hazardous levels of dissolved chromium and/or arsenic, and will be appropriately managed and not sent to the ponds. PG&E's understanding of the</u>		Resolved.		Comment resolved.

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							specific nature of the various wastes in addition to quantity will be further refined through operational experience once the remedy is implemented.”				
624	MWD	Non-design	Request for Information	Vol. 1, Sect.6.1.5/6-6		Provide an estimate of generated waste material (RCRA and Non-RCRA hazardous) that is to be stored onsite and/or disposed of offsite.	It is anticipated that the quantity of hazardous wastes generated from remedy operations to be small. This will be confirmed after start of operations.				Comment resolved.
625	DTSC-123	Design	SOPs	Remedy-SOP-03, O&M Volume 1, Appendix B, Page 10	“4.4.6. Reinstall the low level switch.”	Typo. Revise to “high” level switch.	Text will be revised as requested.	Resolved.			Comment resolved.
626	DTSC-124	Design	SOPs	Remedy-SOP-03, O&M Volume 1, Appendix B	Sheet I-02-01	The figure shows drywell pits being constructed in association with sand separators for wells HNWR-1A and Site B. Ensure that design text (not an SOP) describes the function and dimensions of these units and what will be discharged into these pits. Design drawings (C-01-01, C-01-02, S-01-07) indicate the drywell pits are quite large and, therefore, may be objectionable to Tribes. As these units were hard to find in the design document, it is suggested that they be brought to the attention of the Tribes. As indicated above, DTSC would like to understand the basic operation of these units. How necessary are these pits? Are there alternative methods to knocking out the sand? Why are these type of pits not utilized with most production wells (e.g., Topock 2 and 3). If constructed, will the pit at HNWR-1A be used for HNWR-1 or Site B should they come online?	The sand separator is located at the wellhead to minimize the amount of sand in the water and thereby minimize solids settle-out at the bottom of the downstream conveyance pipe. Accumulated sands from the sand separator will be contained in the purge water. The purge water from the separator will be allowed to percolate into the ground via the dry well filled with rock located near the well. Sands in the dry well will be periodically removed. Dry well is simple to operate and is located within a sub-grade vault. If HNWR-1 were to be brought online, it will share the dry pit with HNWR-1A. If Site B were to be brought online, it will require a separate dry well near the well head. Other options evaluated to remove sands from the freshwater supply well include: 1) using blow-offs to flush solids from low points in the freshwater conveyance piping, 2) installing filters (large) to remove the solids at the well				

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							head, 3) installing a large tank at the well site to allow the solids to settle. These options were rejected for various reasons including the need for multiple blow-offs needed along the freshwater conveyance piping (Pipeline B)/adjacent to County Road 10, large visible equipment near the well head on the Refuge, or inefficient removal of sands. A brief description of the dry well and associated O&M was included in Section 5.4 of the O&M Plan (O&M Manual Volume 1). The following text will be added to Exhibit 3.3-4 of the BOD in response to this comment: "<u>Item: Solids Removal Design Parameter: Install a sand separator at the well head to minimize the amount of sand in the water and thereby minimize solids settle-out at the bottom of the downstream conveyance pipe. Accumulated sands from the sand separator will be contained in the purge water. The purge water from the separator will be allowed to percolate into the ground via the dry well filled with rock located near the well. Periodic removal of the solids accumulating in the dry well is needed.</u>"				
627	DOI-306	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-04_Rev0, 4.1.8/4	Contact the Maintenance Supervisor if there are any notes that require further maintenance…	This statement makes more sense if the word require is replaced with the word indicate. The phrase is used in multiple locations in this SOP and others.	The cited text appears in SOPs – Remedy-SOP-04, 07, and 08, PIPE-SOP-02, and RTP-SOP-09. The cited text will be modified as follows (modification shown as strikeout [~~strikeout~~; for text deletion] and underline [<u>underline</u>; for text addition]) in each of		Accepted.		Comment resolved.

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							these SOPs: "Contact the Maintenance Supervisor if there are any notes that <u>indicate</u> ~~require~~ further maintenance <u>is required</u> so parts can be procured and work can be scheduled."				
628	DOI-307	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-04_Rev0, 4.3/5	CAUTION: Chemicals in the metering pumps may cause personal harm if procedures aren't followed properly…	This caution statement belongs in the introduction (suggest in bold font) because it has applicability to centrifugal pump (clean-in-place pump - P744), hose pumps for carbon substrate and well maintenance chemicals, and sump pump PMP-907 at the Remedy-produced Water Conditioning Plant. Also, the SOP does not have procedures that adequately address avoidance of personnel harm. Suggest adding appropriate references to the Health and Safety Plan and Hazardous Materials Management Plan. Following 4.3.8 and 4.3.9 without adequate skin protection will result in serious harm to the skin.	• At the end of the second paragraph in Section 1 the following sentence will be added in bold text: "<u>**CAUTION: Chemical contained in pumps covered by this SOP may cause personal harm if procedures are not followed properly.**</u>" • At the beginning of Section 4.3 the following statement will be added: "3. Chemical metering pumps CAUTION: Chemical in the metering pumps may cause personal harm if procedures aren't followed properly. <u>Refer to the Health and Safety Plan for proper safety practices and management of hazardous materials while conducting the following procedure.</u>"		Accepted.		Comment resolved.
629	DOI-308	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-04_Rev0, 4.5.6/7	Check that the discharge pressure is within the specified	The SOP does not indicate addition of water in order to check a discharge pressure for a sump pump. Revise accordingly.	The preventative maintenance procedures for sump pumps, as described in Section 4, Item 5 (Sump Pumps) of		Accepted.		Comment resolved.

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					parameters in the O&M manual.		Remedy-SOP-04 will only be performed if liquid is present in the sump. To that end, the following text will be added at the end of Steps 5.6 and 5.7: " <u>(maintenance to be performed when liquid is present in the sump)</u>"				
630	DOI-315	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-07_Rev0, 4.5.2/3	If it is suspected that the liquid/solid accumulation in the secondary containment is hazardous material…	This statement is insufficient instruction. Suggest clarifying which secondary containments may have a hazardous material release and how this will be assessed.	Each of the secondary containments listed under Item #1 of Section 4 (Procedure) may contain a hazardous material release. The operator will identify the source of the release by visually inspect the area around storage containers, review liquid level trends for indication of leakage, and review material inventory, as appropriate. Item 4.5.2 will be modified as follows (modification shown as strikeout [~~strikeout~~; for text deletion] and underline [<u>underline</u>; for text addition]): "5.2. If it is suspected that the ~~liquid/solid accumulation in the secondary containment is hazardous material~~ release is hazardous material (e.g., from visual inspection of area around storage containers, after review of liquid level trends, after review of inventory, etc.), reference the Hazardous Materials Business Plan (HMBP) for further direction on storing and handling hazardous materials<u>, and contact the Maintenance Supervisor</u>."		Accepted.		Comment resolved.
631	DOI-316	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-07_Rev0, 4.6.2/3	If the sump pump is dysfunctional, remove the liquid/solid accumulation	There is no instruction for disposal of this material? Suggest adding the instruction or referencing another SOP or plan where details can be found.	The following sentence will be added at the end of Section 4.6.2: "<u>Refer to the Waste Management Plan (Section 6 of the O&M</u>		Accepted.		Comment resolved.

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					using the appropriate equipment (shop-vac, vac truck, spare sump pump, etc.).		<u>Plan) for proper handling of the liquid/ solid accumulation.</u>”				
632	DOI-317	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-08_Rev0, 1/1	The objective of this Standard Operating Procedure (SOP) is to describe the procedure for inspection and maintenance of frac tanks at the MW-20 Bench and Remedy-produced Water Conditioning Plant	The only tanks labeled as frac tanks in the drawings are at the MW-20 bench. Please clarify.	Frac tanks are located at the Conditioned Water Storage Tank Farm, Influent Tank Farm, and the MW-20 Bench. Text of the SOP which will be revised as follows (modification shown as strikeout [~~strikeout~~; for text deletion] and underline [<u>underline</u>; for text addition]): “The objective of this Standard Operating Procedure (SOP) is to describe the procedure for inspection and maintenance of frac tanks at the MW-20 Bench ~~and Remedy-produced Water Conditioning Plant~~ <u>(Tanks T-720, T-721, and T-723), the Conditioned Water Storage Tank Farm Tanks TNK-401 and TNK-402), and the Influent Tank Farm (Tanks TNK-201 to -204</u>.”		Resolved.		Comment resolved.
633	DOI-318	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-08_Rev0, 4.1.1.1/1	Reference the Hazardous Materials Business Plan (HMBP) if the tank contains hazardous materials (acid or caustic)…	Frac tanks would not contain acid or caustic. Please clarify.	Frac tanks could potentially contain an acid or a caustic material as a result of a chemical feed pump failure or a spill in the chemical storage area.		Resolved.		Comment resolved.
634	DOI-319	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-08_Rev0, 4.1.1.2/1	Shut down and/or drain the tank if it is warranted	There needs to be an instruction for this operation. Suggest including the instruction or cross referencing to the appropriate SOP.	The cited SOP (Remedy-SOP-08) was updated to reflect this comment. The revised SOP is included in **Attachment M** of the final RTC table.		Resolved.		Comment resolved.
635	DOI-320	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-08_Rev0, 4.5/2	Fall protection must also be used when inspecting the lid of the tanks. Set up and connect to fall protection and ascend onto the roof of the	This does not appear to be sufficient instruction. Suggest adding more details or cross referencing to the health and safety plan or other document containing the appropriate details.	The following sentence will be added to Section 4, Item 5 of Remedy-SOP-08: "<u>If fall protection is required pursuant to California Code of Regulations (CCR) Title 8, the operator should review the requirements</u>		Accepted.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					tank		in the Health and Safety Plan."				
636	DOI-321	Non-design	SOPs	Vol.1; Appendix B, Remedy-SOP-08_Rev0, 4.12/2	Contact the Maintenance Supervisor if there are any notes that require further maintenance so parts can be procured and work can be scheduled.	There is no instruction for taking notes. Suggest providing the instruction or cross referencing to a document that contains instructions for record keeping. Also, "require" should be "indicate".	PG&E plans to have a maintenance management system that will be used to direct workers to perform tasks and to record the completion of tasks. Completion of tasks would include written notes about observations of equipment performance, notations about unusual results, photographs and documentation regarding future actions initiated to address problems. The system will include the use of wireless devices such as tablets which would be used to make such record keeping efficient and complete. Therefore, in Section 4, step 12 of Remedy-SOP-08, the operator would refer to notes that have been recorded in the wireless device while performing the procedure. Text will be revised as requested.		Accepted.		Comment resolved pending DOI review of the final design documents.
637	DTSC-125	Design	SOPs	Remedy-SOP-08, O&M Volume 1, Appendix B, Page 2		DTSC desires that releases/leakage be photographed so that the extent of a significant release is well documented. Which SOP(s) will remind employees to conduct this activity? Perhaps SOPs related to inspections, releases, and waste management.	Releases/leakage will be photographed, if practical and safe, and documented by the operators using wireless devices, as discussed in RTC #636. This activity will be included in the spill response procedures of the Hazardous Material Business Plans (HMBPs).	Resolved.			Comment resolved.
638	DOI-290	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 3/3	Equipment list	Suggest adding "Manufacturer's operation and maintenance manuals" to the list.	"Manufacturer's operation and maintenance manuals" will be added to the Equipment List (Section 3) as suggested.		Resolved.		Comment resolved.
639	DOI-291	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.1.5a/3	mechanical process piping non-functioning	This statement seems unclear. Suggest being more specific, like pipe is or has been leaking.	Step 1.5a will be revised as follows: "If any items are noted as non-functioning (e.g., signs of deterioration or		Resolved.		Comment resolved.

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							damage, evidence of leakage) inform the Maintenance Supervisor."				
640	DOI-292	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.1.5b/3	electrical and instrumentation and controls not functioning	There needs to be more instruction on the testing protocol, or reference to the manufacturer's manual to conduct appropriate testing.	Step 1.6 will be revised as follows: "1.6 ~~Visually inspect that~~ Check the electrical and instrumentation and controls ~~are in good working condition~~. a. Visually inspect that these are in good working condition. b. Conduct testing in accordance with the manufacturer's manual as appropriate. If any items are noted as non-functioning inform the Maintenance Supervisor."		Resolved.		Comment resolved.
641	DOI-293	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.2.2c	Determine if the water was from rain water from recent storms or a leak in process piping.	Steps should be provided to the operator as to how they are to determine the source of the water, i.e., probes or sensors, visual examination of surrounding area (ponding in area), examination of valves and piping for staining, moisture, signs of leaks/damage.	Step 2.2c will be revised as follows: "2.2c Determine if the water was from rain water from recent storms or a leak in process piping. Visually inspect the piping for staining, moisture, or other signs of leaks/damage, paying close attention to valves, joints, and connections."		Resolved.		Comment resolved.
642	DOI-294	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.2.3c/3	Lockout/ tagout the well/pipeline, if necessary	There needs to be a reference to a LO/TO procedure.	"Lockout/tagout manual and tags" will be added to the Equipment List (Section 3), and Step 2.3c will reference the manual.		Resolved.		Comment resolved.
643	DOI-295	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.2.3d/3	Drain and evacuate the conveyance lines	Seems too vague to know exactly how to perform this step. Suggest being more specific regarding valving and how it drains.	Step 2.3d will be revised as follows: "2.3d Drain and evacuate the conveyance lines (1) Disassemble the process piping. (2) Drain excess water into buckets." Buckets will be added to the Equipment List (Section 3).		Resolved.		Comment resolved.
644	DOI-296	Non-design	SOPs	Vol.1;	Hydrostacally	Correct spelling to "hydrostatically"	The spelling will be		Resolved.		Comment resolved.

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				Appendix B, PIPE-SOP-02_Rev0, 4.2.3f/3	test the line to verify the leak has been fixed.	Seems too vague to know exactly how to perform this step. Suggest being more specific regarding valving, pump startup, etc.	corrected as appropriate. Step 2.3f-g will be revised as follows: "2.3f Hydrostatically test the line to verify the leak has been fixed. (1) Reassemble the process piping to connect to the in-well pump. (2) Activate the in-well pump to pressurize the line. (3) Examine the line for leakage. 2.3g If the leak persists, repeat steps 2.3c through f."				
645	DOI-297	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.2.3i/3	Inspect the adjacent upstream and downstream conveyance system to see if there is liquid/solid accumulation from the condition that was addressed	This is very vague. Suggest being more specific.	Step 2.3i will be removed as it is not directly applicable to leakage.		Resolved.		Comment resolved.
646	DOI-298	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.3/3	Sump Pump	A sump pump is not shown on any of the drawings. Suggest acknowledging this in the text.	Sump pumps (PMP-FW02-101 and PMP-FW02-102, and PMP-IRL04-650 and PMP-IRL0-651) are shown in the secondary containment pump station vaults for FW-2 and IRL-4, respectively. The associated drawings, Drawing I-02-02 and E-05-04, will be added to Section 2 (Drawing Numbers) of the SOP.		Accepted.		Comment resolved pending DOI review of the final design documents.
647	DOI-299	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.3.3/3	Visually inspect that electrical connections are in good condition	Seems vague. Suggest describing the characteristics of good conditions (or poor conditions).	Step 3.1b will be revised as follows: "3.1b Visually inspect that electrical connections are in good condition. (1) Check that connections are secure. Check for signs of rust or wear."		Resolved.		Comment resolved.

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
648	DOI-300	Non-design	SOPs	Vol.1; Appendix B, PIPE-SOP-02_Rev0, 4.3.5/3	Check for excessive noise, vibrations and oil temperatures	Again, vague. Even though the manufacturer's instruction manual is referenced, is water added to the sump? Do you run it without water?	Steps 3.1d-e will be revised as follows to clarify: "3.1d Operate the pump if it is not already running. 3.1e Check for excessive noise, vibrations and oil temperatures while the sump pump is running. Troubleshoot…" Note that water will not be added for this check.		Resolved.		Comment resolved.
649	DOI-322	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-05_Rev0, 1/1	The objective of this Standard Operating Procedure (SOP) is to describe the procedures for (a.) manual and (b.) automated operation of secondary containment within the RTP and associated areas	This SOP does not address managing a spill. Suggest adding a cross reference to the SPCC plan.	The following sentence will be added to the second paragraph of Section 1 of RTP-SOP-05: "In the event of a spill, refer to the spill response procedures included in the HMBPs."		Resolved.		Comment resolved.
650	DOI-323	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-05_Rev0, 5.2.4/4	If the accumulation appears to be from a chemical storage tank, check the pH and conductivity of the accumulation using handheld meters.	If the release is from the coagulant storage tank, pumping the material to the influent storage tanks has the potential of creating considerable sludge. Please clarify if this is the appropriate action to take for a coagulant release.	A coagulant release can be pumped to the influent storage tanks slowly to prevent the formation of significant sludge. Item 5.2.4.5 will be revised as follows: "2.4.5 <u>Slowly</u> transfer liquids/solids from the Influent Tank Farm sump to the influent tanks or TCS waste water tank as instructed in step a.1.4 through a.1.5/a.1.6. <u>Alternatively, if the release is a large quantity (determined by the Maintenance Supervisor), recover the material and store in drums. If the release is a small quantity, use absorbent material to soak up the release</u>."		DOI concurs with the response.		Comment resolved.
651	DOI-324	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-05_Rev0, 5.2.4/4	If the pH is less than or equal to 2 or greater than or equal to 12.5, it is	There is no instruction for containerization or neutralization. Suggest adding the instruction. If containerized, include instructions for waste management.	As stated in RTCs #637 DTSC-125 and #649 DOI-322, instructions for containerization, neutralization, and/or		Resolved.		Comment resolved.

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					considered a corrosive hazardous waste, and will need to be containerized or neutralized before proceeding.		associated waste management will be provided in the spill response procedures (include in the HMBPs).				
652	DOI-309	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-06_Rev0, 5.a.2/2	Make sure there is a non-hazardous waste label showing accumulation "start" date on front end of liquid phase separator	The SOP needs to address the actions to take if a non-hazardous waste label is not present or the accumulation start date is not filled in.	Item 5.a.2 will be revised as follows: "5.a.2 Make sure there is a non-hazardous waste label showing accumulation 'start' date on front end of liquid phase separator. If no label is present, apply a non-hazardous waste label and fill in the accumulation 'start' date."		DOI concurs with the response.		Comment resolved.
653	DOI-310	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-06_Rev0, 5.b.2	Make sure there is a non-hazardous waste label showing accumulation "start" date and "end" date on front end of liquid phase separator	It would seem that the operator should fill in the end date. Please revise accordingly.	Item 5.b.2 will be revised as follows (revision shown as strikeout [~~strikeout~~; for text deletion] and underline [underline; for text addition]): "Make sure there is a non-hazardous waste label showing accumulation 'start' date ~~and 'end' date~~ on front end of liquid phase separator; fill in the accumulation 'end' date on the non-hazardous waste label."		DOI concurs with the response.		Comment resolved.
654	DOI-311	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-06_Rev0, 5.c/3	Loading liquid phase separator to process system:	It would seem that the operator should attach a non-hazardous waste label and fill in the accumulation start date. This step should be added.	Item 5.c.11 will be revised as follows: "5.c.11 *If the new liquid phase separator is to be the primary liquid phase separator*: Move the ladder directly beneath the manual upstream valve, if necessary. Ensure the ladder is secure. Carefully ascend the ladder. Open the manual upstream valve. Apply a non-hazardous waste label and fill in the accumulation 'start' date. Carefully descend the ladder."		DOI concurs with the response.		Comment resolved.
655	DOI-329	Non-design	SOPs	Vol.1; Appendix B,	Plug in the Influent Tank	There should be some instruction on valving to direct discharge from the pumps, e.g., the manual valves are configured to pump liquids/solids from the designated sump pump to its normal	A portable pump is used for removing cleaning		DOI concurs with the response.		Comment resolved.

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				RTP-SOP-07_Rev0, 5.a.2/2	Farm Sump Pump (PMP-205) or Conditioned Water Tank Farm Sump Pump (PMP-407).	pumping destination.	fluids however; the sump pumps are plugged in just in case fluids enter the sump. The valving for PMP-407 (V-463A and V-463B) and PMP-205 (V-265A and V-265B) will be opened as necessary. Item 5.a.2 will be revised as follows: “2. Plug in the Influent Tank Farm Sump Pump (PMP-205) or Conditioned Water Tank Farm Sump Pump (PMP-407). As necessary, open the sump pump valves (V-463A and V-463B of V-265A and V-265B).”				
656	DOI-330	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-07_Rev0, 5.a.4/2	Connect the outlet hose on the portable pump.	What is this portable pump? Please clarify.	This SOP is for cleaning frac tanks with a portable pump. A non-dedicated portable pump will be used to remove liquids from the frac tanks.		Okay.		Comment resolved.
657	DOI-325	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-08_Rev0, 5.3.a.i/2	The operator is to use hand signals to stop the truck when the front trailer axle is at the south end of the containment pad …	A standard set of hand signals for use by truckers and system operators should be included within the procedure to minimize miscommunication potential.	The following item will be added to Section 3 (Equipment) of RTP-SOP-08: “• OSHA suggested spotting signals for vehicles (Attached)”. A printout of OSHA suggested spotting signals for vehicles will be attached to the SOP (adapted from the following web page: https://www.osha.gov/doc/topics/backover/spotter.html), and is included as **Attachment N** to the final RTC table. The spotting signals detailed in the printout are not required by any OSHA standard, but are common amongst industry. Additionally, Section 5, step 3, substep a. will be revised as follows (and subsequent steps will be renumbered appropriately):		Resolved.		Comment resolved.

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							"~~a. As the truck moves to the loading area, the operator directs the truck driver for the placement of the truck on the containment pad.~~ ~~i. The operator is to use hand signals to stop the truck when the front trailer axle is at the south end of the containment pad (opposite of the entrance). This assures enough room in the containment pad behind the trailer to catch any minor spills. This also provides enough room for the hose to be in the containment pad in case it is dropped during connecting or disconnecting to the trailer.~~ a. When the driver arrives to the entrance of the loading area, the operator will discuss with the driver the preferred orientation of the truck on the loading pad: The truck will be stopped when the front trailer axle is at the south end of the containment pad (opposite of the entrance). This assures enough room in the containment pad behind the trailer to catch any minor spills. This also provides enough room for the hose to be in the containment pad in case				

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							it is dropped during connecting or disconnecting to the trailer. The operator will also discuss with the driver that they will direct the driver onto the containment pad using hand signals. The operator will verify that the OSHA suggested spotting signals for vehicles (Attached to this SOP) are okay to use, and add/modify hand signals as needed." b. As the truck moves to the loading area, the operator directs the truck driver for the placement of the truck on the containment pad using the agreed upon hand signals"				
658	DOI-312	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-08_Rev0, 5.4.g/3	Open the load supply valve	This valve is not shown on the drawing? What about opening valves V-510B and V-501C? Please clarify	The cited text will be clarified as follows (revision shown as strikeout [~~strikeout~~; for text deletion] and underline [underline; for text addition]): "~~Open the load supply valve~~ Open the load-out supply hose valve." In step 5.4.f, the sentence will be revised as follows: "Double check truck valves and vents and confirm with the driver that the truck is ready to receive water before ~~opening load-out hose supply valve~~ opening the load-out supply hose valve (remember that water may gravity-flow out of the hose even if the pump is off)." A typo was also found in the valve number referenced in item 5.4.e. The manual valve downstream of the TCS Truck Fill Pump is actually V-501C, not V-510C. This correction will be made.		DOI concurs with the response.		Comment resolved.
659	DOI-313	Non-design	SOPs	Vol.1;	Confirm that	How will the operator know what are the appropriate forms? Please specify.	A waste manifest will be		Resolved.		Comment resolved.

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				Appendix B, RTP-SOP-08_Rev0, 5.6.b/3	you and the driver have filled out and signed appropriate forms		the appropriate form for off-site trucking. Section 5, step 6.b. of RTP-SOP-08 will be revised as follows: "Confirm that you and the driver have filled out and signed ~~appropriate forms~~ the manifest and that the ~~shipping documentation~~ manifest has been properly filled in and the ~~shipping documentation~~ manifest number recorded.				
660	DOI-314	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-08_Rev0, 5.7.a/3	Work with the driver to inspect that the truck is in a safe condition and that it is not overweight.	Is there a weigh station? Is this a calculation based on volume stored? Please specify.	There is not a weigh station at the Remedy-produced Water Conditioning Plant. The truck will be determined to be safe based on the volume of water being transported and the capacity of the truck. The sentence will be revised as follows: "~~Work~~ <u>Verify</u> with the driver ~~to inspect~~ that the truck is in a safe condition and that it is not ~~overweight~~ <u>overly full</u>."		DOI concurs with the response.		Comment resolved.
661	DTSC-126	Design	SOPs	RTP-SOP-08_Rev0, O&M Volume 1, Appendix B, Page 4	Sheet I-14-02 "Future Infiltration Gallery" "Future Moabi Regional Park"	Piping is improperly depicted on drawing I-14-02 as leaving the Conditioned Water Storage Tank TNK-510 and traveling to Bat Cave Wash and the MW-20 Bench for the Future Infiltration Gallery (2" –TW-PULK-140207) and Future Moabi Regional Park (2" –TW-PULK-140208) respectively. The drawing needs to be updated since these two options have been removed from the remedy design. This drawing is contained in several other SOPs.	References to "Future Infiltration Gallery" and "Future Moabi Regional Park" were removed from Sheet I-14-02, that was included in the 90% design submittal (September 2014).	Resolved.			Comment resolved.
662	DOI-326	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-09_Rev0, 4.1.1.1/1	Shut down and/or drain the tank if it is warranted (e.g. the tank is in danger of a blow out or failure)	Suggest adding an instruction for this operation.	Section 4 of RTP-SOP-09 has been updated to detail procedures for the shutting down and draining the Conditioned Water Storage Tank (see **Attachment O** to the final RTC table).		Accepted.		Comment resolved pending DOI review of the final design documents.
663	DTSC-127	Non-design	SOPs	RTP-SOP-10_Rev0, O&M Volume 1, Appendix B, Page 1	"approximately 10 miles west of Needles"	Change cited text to read, "approximately 12 miles southeast of Needles". Same for RTP-SOP-05.	The cited text was revised as suggested in both SOPs that were included in the 90% design submittal (September 2014).	Resolved.			Comment resolved.
664	DOI-327	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-10_Rev0, 4.a/2	…water level is full or backwash pumps have completed their	It would appear this should be "and/or" rather than "or". Please clarify.	The referenced sentence will be revised as requested: "Designated influent tank(s) (TNK-201; TNK-		DOI concurs with the response.		Comment resolved.

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					designated cycles		202; TNK-203; TNK-204) water level is full and/or backwash pumps have completed their designated cycles."				
665	DOI-328	Non-design	SOPs	Vol.1; Appendix B, RTP-SOP-10_Rev0, 5.b.10/3	Use the HMI to return the conditioned water transfer pumps on the filter system A-side (PMP-310 or PMP-320) to the regular Backwash Schedule, unless otherwise instructed.	It would appear this should be pumps PMP-405 and PMP-406 and not pumps PMP-310 and PMP-320. Also, rather than Backwash Schedule shouldn't this refer to the Transfer Schedule?	Correct, the text will be revised to reference pumps PMP-405 and PMP-406, and the Transfer Schedule.		Accepted.		Comment resolved pending DOI review of the final design documents.
666	DTSC-122	Design	SOPs	PWR-SOP-01, O&M Volume 1, Appendix B, Page 2	"i. If liquid accumulation is present, remove using a shop-vac.."	A determination should be made if the liquid contains contaminants or is a hazardous waste. The SOP should be revised to address this issue.	Besides ponded rainwater, the only other potential liquid accumulation is leaked transformer oil. It is likely that a transformer oil such as "R-Temp" by Cooper Power Systems, which is non-hazardous, will be used onsite. Although it is not likely that a hazardous transformer oil will be used, for flexibility, the cited text will be revised as follows: "i. If liquid accumulation is present, <u>inspect the liquid accumulation to see if it has a sheen and/or petroleum odor.</u> <u>ii. If the liquid accumulation has no sheen and/or petroleum odor,</u> remove using a shop-vac. <u>iii. If the liquid accumulation has a sheen and/or petroleum odor, verify that the transformer oil is a non-hazardous waste by referring to its SDS (in the Health and Safety Plan).</u> • <u>If the leaked transformer oil is a non-hazardous waste, remove using a shop-vac.</u>	Resolved.			Comment resolved.

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							• <u>If the leaked transformer oil is a hazardous waste, remove using absorbent.</u>				
Specific Comments – 90% BOD, Appendix L: O&M Manual -- Volume 2: Sampling and Monitoring Plan											
667	DOI-94	Design	O&M	Appendix L, Vol.2; 2.1 p. 2-2	The Tables 2.1 4 and 2.1 5 include anticipated Cr(VI) concentration trends toward treatment to less than 32 g/L for wells located within the plume boundary. As the remedy progresses, if the observed concentration trends are not consistent with anticipated Cr(VI) attenuation timeframes (i.e., if the monitoring results indicate that Cr[VI] attenuation is actually taking substantially longer than anticipated), then operational changes to the …	The information in Tables 2.1.4 and 2.1.5 simply indicates whether the trend should be increasing or decreasing at each well based on the model results. An important aspect of this approach that is lost is that it's not just whether the trend is decreasing but the rate that the concentrations are decreasing. This approach really makes it difficult, particularly for a third party review, to evaluate the monitoring data against the model predicted attenuation rates. Since the modeling results are being used to establish whether the attenuation is occurring at the anticipate rate the actual model predicted concentration vs. time data at each of the wells should be provided. The means by which the trends will be established should also be mentioned.	The intent of Tables 2.1.4 and 2.1.5 is to provide a basis for looking at well-specific data to see if areas of the site are following the general trends that are anticipated. If the trends are not behaving as anticipated, the implications for the remedy will be evaluated by recalibrating the model to incorporate the observed data and re-predict the remedial timeframe. The changes in predicted timeframe, rather than any individual well trend, will be used to make decisions about whether additional infrastructure is needed. More quantitative descriptions of anticipated trends at individual wells are not recommended, because it would imply greater certainty in the model and imply greater importance in decision making for individual well trends than intended.		Resolved.		Comment resolved.
668	FMIT/TRC	Non-design	GW Modeling	Append L Vol. 2 2.1/p 2.3	"If operational adjustments are implemented, the effects will be assessed in the context of the overall plume remediation using the field data and re-calibrated groundwater modeling projections."	This is unclear: 1) Does it just refer to re-calibration of the GW flow model, or also recalibration of the fate/transport model? What are calibration data and targets? 2) Would this include re-calibration of the regional MicroFEM model 1st, followed by local scale Modflow model updates (i.e. new BC and new parameters)? Using PEST? Optimization runs? 3) This statement suggests the model will be used first to assess changes (i.e. alternatives), and then second to assess effects AFTER operational adjustments have been implemented, but WON'T be used to guide operational adjustments?	1. The groundwater flow model, geochemical model, and solute transport model will all be recalibrated to data collected prior to scheduled model update interval. 2. The regional MicroFEM model recalibration will need to be conducted first and then directly converted to the MODFLOW submodel. The flow model will be calibrated to observed			This PG&E response is still very vague and doesn't appear adequately thought-out. To avoid future confusion to all stakeholders, Hualapai request that PG&E consultants revise such text (throughout the documents) to further clarify a) exactly which models will be updated (i.e., 4 different models described in Appendix B (90%BOD) -	PG&E Response: Additional details on potential model update components will be included consistent with RTC #76. The groundwater flow, solute transport, and geochemical models will all be updated as per the defined model update schedule. All hydrogeologic, water level, groundwater quality, and operational data will

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							water levels and PEST will be used to refine the calibration process. The model will be used to assess proposed remedy design/ operational adjustments to gauge the impact with predictive simulations			MicroFEM, Modflow, MT3D, and Phreeqc), b) what will be updated (i.e., inputs changed, and basis), c) what is involved in re-calibration, d) what will be used as new calibration targets, e) what the calibration tolerances will be - to meet continued use of the model (i.e., Tables 2.1-4 and 2.1-5 and Figures 2.2-2 thru 2.2-9 in O&M Vol2 document) to meet RAO performance evaluations. With respect to the substantial amount of hydrogeologic/chemical data that will be collected during installation/testing/startup - Tribes also request that PG&E consultants make it very clear how these data will be a) interpreted or characterized with existing datasets, How the conceptual site model (CSM) will be updated, c) how these data will be incorporated into the existing model (i.e., will model layers be adjusted to match new well screens instead of stratigraphic boundaries), and d) how exactly will PEST be used (and constrained), given the noted problems with poorly constrained distributions (i.e., for example beneath the river) based on data available from boreholes in California, but ill-constrained because of lack of data beneath the river and throughout AZ. Finally – PG&E	be considered in the recalibration process. Calibration will be conducted in accordance to industry standards (i.e., ASTM). The conceptual site model (CSM) will be updated as additional data is collected and the response to the remedy operations are observed. Specific details on exact model and CSM updates cannot be defined until the data has been collected and analyzed.

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										consultants should also clarify for Hualapai and all stakeholders details associated with any new scenario optimizations, especially optimization criteria and performance metrics.	
669	Hualapai/TRC	Non-design	GW Modeling	Append L Vol. 2 2.1/p 2.3	"If operational adjustments are implemented, the effects will be assessed in the context of the overall plume remediation using the field data and re-calibrated groundwater modeling projections."	This is unclear: 1) Does it just refer to re-calibration of the GW flow model, or also recalibration of the fate/transport model? What are calibration data and targets? 2) Would this include re-calibration of the regional MicroFEM model 1st, followed by local scale Modflow model updates (i.e. new BC and new parameters)? Using PEST? Optimization runs? 3) This statement suggests the model will be used first to assess changes (i.e. alternatives), and then second to assess effects AFTER operational adjustments have been implemented, but WON'T be used to guide operational adjustments?	See above			This PG&E response is still very vague and doesn't appear adequately thought-out. To avoid future confusion to all stakeholders, Hualapai request that PG&E consultants revise such text (throughout the documents) to further clarify a) exactly which models will be updated (i.e., 4 different models described in Appendix B (90%BOD) - MicroFEM, Modflow, MT3D, and Phreeqc), b) what will be updated (i.e., inputs changed, and basis), c) what is involved in re-calibration, d) what will be used as new calibration targets, e) what the calibration tolerances will be - to meet continued use of the model (i.e., Tables 2.1-4 and 2.1-5 and Figures 2.2-2 thru 2.2-9 in O&M Vol2 document) to meet RAO performance evaluations. With respect to the substantial amount of hydrogeologic/chemical data that will be collected during installation/testing/startup - Tribes also request that PG&E consultants make it very clear how these data will be a) interpreted or characterized with existing datasets, How the conceptual	See response 668

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										site model (CSM) will be updated, c) how these data will be incorporated into the existing model (i.e., will model layers be adjusted to match new well screens instead of stratigraphic boundaries), and d) how exactly will PEST be used (and constrained), given the noted problems with poorly constrained distributions (i.e., for example beneath the river) based on data available from boreholes in California, but ill-constrained because of lack of data beneath the river and throughout AZ. Finally – PG&E consultants should also clarify for Hualapai and all stakeholders details associated with any new scenario optimizations, especially optimization criteria and performance metrics.	
670	Cocopah/TRC	Non-design	GW Modeling	Append L Vol. 2 2.1/p 2.3	"If operational adjustments are implemented, the effects will be assessed in the context of the overall plume remediation using the field data and re-calibrated groundwater modeling projections."	This is unclear: 1) Does it just refer to re-calibration of the GW flow model, or also recalibration of the fate/transport model? What are calibration data and targets? 2) Would this include re-calibration of the regional MicroFEM model 1st, followed by local scale Modflow model updates (i.e. new BC and new parameters)? Using PEST? Optimization runs? 3) This statement suggests the model will be used first to assess changes (i.e. alternatives), and then second to assess effects AFTER operational adjustments have been implemented, but WON'T be used to guide operational adjustments?	See above			This PG&E response is still very vague and doesn't appear adequately thought-out. To avoid future confusion to all stakeholders, Tribes request that PG&E consultants revise such text (throughout the documents) to further clarify a) exactly which models will be updated (i.e., 4 different models described in Appendix B (90%BOD) - MicroFEM, Modflow, MT3D, and Phreeqc), b) what will be updated (i.e., inputs changed, and basis), c) what is involved in re-calibration, d) what will be used as new	See response 668

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										calibration targets, e) what the calibration tolerances will be - to meet continued use of the model (i.e., Tables 2.1-4 and 2.1-5 and Figures 2.2-2 thru 2.2-9 in O&M Vol2 document) to meet RAO performance evaluations. With respect to the substantial amount of hydrogeologic/chemical data that will be collected during installation/testing/startup - Tribes also request that PG&E consultants make it very clear how these data will be a) interpreted or characterized with existing datasets, b) how the conceptual site model (CSM) will be updated, c) how these data will be incorporated into the existing model (i.e., will model layers be adjusted to match new well screens instead of stratigraphic boundaries), and d) how exactly will PEST be used (and constrained), given the noted problems with poorly constrained distributions (i.e., for example beneath the river) based on data available from boreholes in California, but ill-constrained because of lack of data beneath the river and throughout AZ. Finally – PG&E consultants should also clarify for Tribes and all stakeholders details associated with any new scenario optimizations, especially optimization criteria and performance metrics.	

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671	Chemehuevi/ TRC	Non-design	GW Modeling	Append L Vol. 2 2.1/p 2.3	"If operational adjustments are implemented, the effects will be assessed in the context of the overall plume remediation using the field data and re-calibrated groundwater modeling projections."	This is unclear: 1) Does it just refer to re-calibration of the GW flow model, or also recalibration of the fate/transport model? What are calibration data and targets? 2) Would this include re-calibration of the regional MicroFEM model 1st, followed by local scale Modflow model updates (i.e. new BC and new parameters)? Using PEST? Optimization runs? 3) This statement suggests the model will be used first to assess changes (i.e. alternatives), and then second to assess effects AFTER operational adjustments have been implemented, but WON'T be used to guide operational adjustments?	See above			This PG&E response is still very vague and doesn't appear adequately thought-out. To avoid future confusion to all stakeholders, Tribes request that PG&E consultants revise such text (throughout the documents) to further clarify a) exactly which models will be updated (i.e., 4 different models described in Appendix B (90%BOD) - MicroFEM, Modflow, MT3D, and Phreeqc), b) what will be updated (i.e., inputs changed, and basis), c) what is involved in re-calibration, d) what will be used as new calibration targets, e) what the calibration tolerances will be - to meet continued use of the model (i.e., Tables 2.1-4 and 2.1-5 and Figures 2.2-2 thru 2.2-9 in O&M Vol2 document) to meet RAO performance evaluations. With respect to the substantial amount of hydrogeologic/chemical data that will be collected during installation/testing/startup - Tribes also request that PG&E consultants make it very clear how these data will be a) interpreted or characterized with existing datasets, b) how the conceptual site model (CSM) will be updated, c) how these data will be incorporated into the existing model (i.e., will model layers be adjusted to match new well screens instead of stratigraphic	See response 668

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										boundaries), and d) how exactly will PEST be used (and constrained), given the noted problems with poorly constrained distributions (i.e., for example beneath the river) based on data available from boreholes in California, but ill-constrained because of lack of data beneath the river and throughout AZ. Finally – PG&E consultants should also clarify for Tribes and all stakeholders details associated with any new scenario optimizations, especially optimization criteria and performance metrics.	
672	DOI-95	Design	O&M	Appendix L, Vol.2; 2.2.2 p. 2-4	In addition, Cr(VI) concentration changes from IRL injection downgradient monitoring wells will be compared to anticipated concentration changes and timeframes predicted from solute transport modeling, as summarized in Table 2.2 1.	Cr(VI) concentrations are not provided in Table 2.2.1. Please revise.	In Table 2.2-1, the "Currently-Anticipated Timeframe for Cr(VI) Concentration Decreases" is the timeframe for Cr(VI) concentrations to decrease to less than 32 parts per billion (ppb) as predicted by the solute transport model. This will be clarified in the table. The referenced text will also be revised to reference Tables 2.1-4 and 2.1-5, which provide snapshots of the model-predicted Cr(VI) concentration trends at certain intervals following remedy start-up.		Resolved.		Comment resolved.
673	DOI-96	Design	O&M	Appendix L, Vol.2; 2.2.2 p. 2-4	If the change in hydraulic gradient and the changes in downgradient monitoring well Cr(VI) concentration trends are not within expectations	Please provide a reference to the discussion of expectations.	The referenced text will be revised as follows: "If the change in hydraulic gradient and the changes in downgradient monitoring well Cr(VI) concentration trends are not within expectations (see Boxes 22-26 on Figure 2.2-4), short-term		Resolved.		Comment resolved.

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							adjustments to improve performance…” Cr(VI) concentration trend expectations for the IRL injection downgradient monitoring wells are presented in Tables 2.1-4, 2.1-5, and 2.2-1 (see also response to RTC #672 [DOI-95]).				
674	DOI-97	Design	O&M	Appendix L, Vol.2; 2.2.2 p. 2-5	If TOC concentrations are less than anticipated and Cr(VI) is not treated to less than 32 g/L in samples collected from dose response wells, then operational adjustments such as increasing TOC injection concentrations or changing dosing parameters will be made.	Please indicate where the expected TOC concentrations are presented. Figure 2.2.6 indicates that they should be included in Table 2.1-4 and 2.1-5 but they are not. It looks like the reference should be to Table 2.2-1. Please resolve.	The referenced text will be revised as follows: “If TOC concentrations are less than anticipated (per Table 2.2-1) and Cr(VI) is not treated to less than 32 µg/L in samples collected from dose response wells, then operational adjustments such as increasing TOC injection concentrations or changing dosing parameters will be made.” Box 3 on Figure 2.2-6 will be updated to reference Table 2.2-1 as well as Tables 2.1-4 and 2.1-5.		Resolved.		Comment resolved.
675	DOI-98	Design	O&M	Appendix L, Vol.2; 2.2.2 p. 2-5	If by product concentrations are above the anticipated range, the TOC concentration will be decreased or dosing parameters will be adjusted.	Please clarify how dosing parameter adjustments are different from changing the TOC concentrations. It appears it should be dosing frequency. Please clarify.	The referenced text will be revised as follows: “If by product concentrations are above the anticipated range, the TOC concentration will be decreased or other dosing parameters (i.e., duration or frequency of dosing) will be adjusted.”		Resolved.		Comment resolved.
676	DOI-99	Design	O&M	Appendix L, Vol.2; 2.2.2 p. 2-7.	Action levels for agency notifications will be established for metals, herbicides, pesticides, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons	Please specify at what point in the process these will be established.	Action levels will be determined once the initial extracted water quality has been established (e.g., within the first six months of operation of the River Bank Extraction Wells). The referenced text will be modified as follows: “Action levels for agency notifications will be		Resolved.		Comment resolved.

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					(PAHs), and radionuclides.		determined once the initial extracted water quality has been established. Action levels ~~for agency notifications~~ will be established for metals, herbicides, pesticides, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and radionuclides…”				
677	FMIT/TRC	Design	Monitoring	Append L Vol. 2 IRL DQO-5 p. 2-7	Six-month baseline and 25% Action Levels	There are significant natural variations of byproduct concentrations exhibited in water from wells in the study area. The 25% Action Levels could be violated due to natural variation, which could trigger regulatory enforcement measures, which in turn could delay the timely completion of the remedy. Rather than setting hard baseline values (numerical standards), the geochemistry that contributes to the exceedance event should be described through modeling and visualization in order to describe impacts on the remedy. Geochemical modeling could then be used to simulate ways to reverse or correct the byproduct exceedances.	The purpose of establishing these action levels is to ensure awareness about what concentrations are being injected into the Uplands, rather than to directly trigger changes to remedy implementation. Note that as stated in this section, these action levels do not apply to byproducts arsenic and manganese which have action levels established elsewhere that are based on geochemical modeling and that are part of a process of understanding geochemical changes that are resulting from the remedy (for example, see the discussion of action levels on page 2-2).			How will you know whether arsenic or manganese in water from IRL monitoring wells comes from the freshwater source or from geochemical reactions within the aquifer near injection zones (especially IRL wells that inject carbon)? Arsenic and other water-quality constituents should be monitored in water from the freshwater source well(s). The wording of the section appears as though regulatory actions could be taken that might affect the operations or outcome of the groundwater remedy. If such actions were to occur, Hualapai would appreciate involvement in the data analysis and discussion of the proposed actions. Comment unresolved pending development of a plan to distinguish between different sources of arsenic and manganese at IRL monitoring wells.	
678	Hualapai/TRC	Design	Monitoring	Append L Vol. 2 IRL DQO-5 p. 2-7	Six-month baseline and 25% Action Levels	There are significant natural variations of byproduct concentrations exhibited in water from wells in the study area. The 25% Action Levels could be violated due to natural variation, which could trigger regulatory enforcement measures, which in turn could delay the timely completion of the remedy. Rather than setting hard baseline values (numerical standards), the geochemistry that contributes to the exceedance event should be described through modeling and visualization in order to describe impacts on the remedy. Geochemical modeling could then be used to simulate ways to reverse or correct the byproduct exceedances.	See above			How will it be known whether arsenic or manganese in water from IRL monitoring wells comes from the freshwater source or from geochemical reactions within the aquifer near injection zones (especially IRL wells that inject	

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										carbon)? Arsenic and other water- quality constituents should be monitored in water from the freshwater source well(s). The wording of the section appears as though regulatory actions could be taken that might affect the operations or outcome of the groundwater remedy. If such actions were to occur, Hualapai would appreciate involvement in the data analysis and discussion of the proposed actions. Comment unresolved pending development of a plan to distinguish between different sources of arsenic and manganese at IRL monitoring wells.	
679	Cocopah/TRC	Design	Monitoring	Append L Vol. 2 IRL DQO-5 p. 2-7	Six-month baseline and 25% Action Levels	There are significant natural variations of byproduct concentrations exhibited in water from wells in the study area. The 25% Action Levels could be violated due to natural variation, which could trigger regulatory enforcement measures, which in turn could delay the timely completion of the remedy. Rather than setting hard baseline values (numerical standards), the geochemistry that contributes to the exceedance event should be described through modeling and visualization in order to describe impacts on the remedy. Geochemical modeling could then be used to simulate ways to reverse or correct the byproduct exceedances.	See above			How will you know whether arsenic or manganese in water from IRL monitoring wells comes from the freshwater source or from geochemical reactions within the aquifer near injection zones (especially IRL wells that inject carbon)? Arsenic and other water-quality constituents should be monitored in water from the freshwater source well(s). The wording of the section appears as though regulatory actions could be taken that might affect the operations or outcome of the groundwater remedy. If such actions were to occur, Tribes would appreciate involvement in the data analysis and discussion of the proposed actions. Comment unresolved pending development of a plan to distinguish between different	

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										sources of arsenic and manganese at IRL monitoring wells.	
680	Chemehuevi/ TRC	Design	Monitoring	Append L Vol. 2 IRL DQO-5 p. 2-7	Six-month baseline and 25% Action Levels	There are significant natural variations of byproduct concentrations exhibited in water from wells in the study area. The 25% Action Levels could be violated due to natural variation, which could trigger regulatory enforcement measures, which in turn could delay the timely completion of the remedy. Rather than setting hard baseline values (numerical standards), the geochemistry that contributes to the exceedance event should be described through modeling and visualization in order to describe impacts on the remedy. Geochemical modeling could then be used to simulate ways to reverse or correct the byproduct exceedances.	See above			How will you know whether arsenic or manganese in water from IRL monitoring wells comes from the freshwater source or from geochemical reactions within the aquifer near injection zones (especially IRL wells that inject carbon)? Arsenic and other water-quality constituents should be monitored in water from the freshwater source well(s). The wording of the section appears as though regulatory actions could be taken that might affect the operations or outcome of the groundwater remedy. If such actions were to occur, Tribes would appreciate involvement in the data analysis and discussion of the proposed actions. Comment unresolved pending development of a plan to distinguish between different sources of arsenic and manganese at IRL monitoring wells.	
681	FMIT/TRC	Non-design	GW Modeling	Append L Vol. 2 2.2.3/p. 2-8	"Monitoring will be conducted to verify the model predictions, and lines of evidence that will be used to evaluate groundwater flow and plume control in the area west of the TCS Injection Wells will include: trends in analytical data (e.g., Cr[VI], byproducts,	If CrVI concentrations increase over the short-term what conclusions and decisions will be made, given increasing concentrations in some wells associated with the IM-3 system over several years, probably due to redistribution of concentration within the plume, which remains somewhat uncertain. Were gradients ever used/evaluated during model calibration? If not, should they have been? Because future decisions on operation/design will depend on how observed and simulated gradients compare, it is important to demonstrate to stakeholders that the current model reproduces existing gradients well enough for such future comparisons and subsequent decisions. How well does the current model reproduce hydraulic gradients, especially around wells, and are corrections considered such as the 25' grid spacing and head loss due to skin/pump losses?	Conclusions and decisions will be made by assessing the concentration trends in individual wells and in wells in the nearby vicinity to determine potential patterns in observed trends that would point to a rational explanation, or if it is an anomalous point that needs to be assessed further. Gradients were not used as a specific calibration target in the calibration of the groundwater flow model, but rather the direct observed water			The Tribe emphasizes that field-based (data-driven) decisions will likely be made over short-term trends (i.e., maybe 1 to 3 years) which could simply be due to redistribution of plume concentrations as a number of IM-3 wells have shown, instead of due to improper design/ operation. The main concern continues to be that PG&E consultants may argue that an ever increasing number of wells are required to fix apparent problems, which are	PGE response: This particular section of the BOD describes the data analysis that will be conducted to evaluate whether the operations of the TCS injection wells and freshwater injection well FW-02 are properly balanced to ensure that the TCS injection does not cause westward plume migration. If it is determined based on multiple lines of evidence that migration is

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					and potentially TOC) collected from the TCS Recirculation Loop by-product monitoring wells located to the west of the TCS Injection Wells (Table 2.1-2); and comparison of groundwater elevation data/observed hydraulic gradients to model-predicted gradients."		levels were utilized. However, gradients were still assessed for consistency. Monitoring points within active pumping wells have inherent uncertainty due to frictional head loss, but can still be considered for general assessment. Data from monitoring wells and piezometers will be more reliable. Because extraction/injection wells are attributed to the full intercepted grid cell instead of an exact point, models are more representative of the average water level in the area of active pumping wells. This data can still be utilized to assess the relative gradients in areas and gauge the hydraulic impact of different hydraulic stresses from pumping.			potentially just a misinterpretation of actual conditions. Sufficient time needs to be given to observe desired concentration trends before making decisions such as installing new wells in sensitive cultural areas and thereby increasing significant and potentially unmitigable impacts. Based on this response, it is still unclear what steps will be taken to ensure proper interpretations and decisions are made to limit any new wells unnecessarily.	occurring, the short term action described in the O&M manual is to adjust operational flowrates, not to install additional wells. Only if operational adjustments fail would new wells be considered under the contingency plan. Consideration of any new wells under the contingency plan would be done in accordance with the stakeholder communications/outreach procedures and protocols as detailed in RTCs #44 FMIT/TRC, #45 Hualapai/ TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC.
682	Hualapai/TRC	Non-design	GW Modeling	Append L Vol. 2 2.2.3/p. 2-8	"Monitoring will be conducted to verify the model predictions, and lines of evidence that will be used to evaluate groundwater flow and plume control in the area west of the TCS Injection Wells will include: trends in analytical data (e.g., Cr[VI], byproducts, and potentially TOC) collected from the TCS Recirculation Loop by-product monitoring wells located to the west of the TCS Injection Wells (Table	If CrVI concentrations increase over the short-term what conclusions and decisions will be made, given increasing concentrations in some wells associated with the IM-3 system over several years, probably due to redistribution of concentration within the plume, which remains somewhat uncertain. Were gradients ever used/evaluated during model calibration? If not, should they have been? Because future decisions on operation/design will depend on how observed and simulated gradients compare, it is important to demonstrate to stakeholders that the current model reproduces existing gradients well enough for such future comparisons and subsequent decisions. How well does the current model reproduce hydraulic gradients, especially around wells, and are corrections considered such as the 25' grid spacing and head loss due to skin/pump losses?	See above			Hualapai emphasize that field-based (data-driven) decisions will likely be made over short-term trends (i.e., maybe 1 to 3 years) which could simply be due to redistribution of plume concentrations as a number of IM-3 wells have shown, instead of due to improper design/ operation. The main concern continues to be that PG&E consultants may argue that an ever increasing number of wells are required to fix apparent problems, which are potentially just a misinterpretation of actual conditions. Sufficient time needs to be given to observe desired concentration trends before making rash decisions such as needing new wells in sensitive cultural areas. Based on this response,	See response 681

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					2.1-2); and comparison of groundwater elevation data/observed hydraulic gradients to model-predicted gradients.”					it is still unclear what steps will be taken to ensure proper interpretations and decisions are made to limit any new wells unnecessarily.	
683	Cocopah/TRC	Non-design	GW Modeling	Append L Vol. 2 2.2.3/p. 2-8	“Monitoring will be conducted to verify the model predictions, and lines of evidence that will be used to evaluate groundwater flow and plume control in the area west of the TCS Injection Wells will include: trends in analytical data (e.g., Cr[VI], byproducts, and potentially TOC) collected from the TCS Recirculation Loop by-product monitoring wells located to the west of the TCS Injection Wells (Table 2.1-2); and comparison of groundwater elevation data/observed hydraulic gradients to model-predicted gradients.”	If CrVI concentrations increase over the short-term what conclusions and decisions will be made, given increasing concentrations in some wells associated with the IM-3 system over several years, probably due to redistribution of concentration within the plume, which remains somewhat uncertain. Were gradients ever used/evaluated during model calibration? If not, should they have been? Because future decisions on operation/design will depend on how observed and simulated gradients compare, it is important to demonstrate to stakeholders that the current model reproduces existing gradients well enough for such future comparisons and subsequent decisions. How well does the current model reproduce hydraulic gradients, especially around wells, and are corrections considered such as the 25' grid spacing and head loss due to skin/pump losses?	See above			Tribes emphasize that field-based (data-driven) decisions will likely be made over short-term trends (i.e., maybe 1 to 3 years) which could simply be due to redistribution of plume concentrations as a number of IM-3 wells have shown, instead of due to improper design/ operation. The main concern continues to be that PG&E consultants may argue that an ever increasing number of wells are required to fix apparent problems, which are potentially just a misinterpretation of actual conditions. Sufficient time needs to be given to observe desired concentration trends before making rash decisions such as needing new wells in sensitive cultural areas. Based on this response, it is still unclear what steps will be taken to ensure proper interpretations and decisions are made to limit any new wells unnecessarily.	See response 681
684	Chemehuevi/ TRC	Non-design	GW Modeling	Append L Vol. 2 2.2.3/p. 2-8	“Monitoring will be conducted to verify the model predictions, and lines of evidence that will be used to evaluate	If CrVI concentrations increase over the short-term what conclusions and decisions will be made, given increasing concentrations in some wells associated with the IM-3 system over several years, probably due to redistribution of concentration within the plume, which remains somewhat uncertain. Were gradients ever used/evaluated during model calibration? If not, should they have been? Because future decisions on operation/design will depend on how observed and simulated gradients compare, it is important to demonstrate to stakeholders that the current model reproduces existing gradients well enough for such future comparisons and subsequent decisions. How well does the current model reproduce hydraulic gradients, especially around wells, and are	See above			Tribes emphasize that field-based (data-driven) decisions will likely be made over short-term trends (i.e., maybe 1 to 3 years) which could simply be due to redistribution of plume concentrations as a number of IM-3	See response 681

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					groundwater flow and plume control in the area west of the TCS Injection Wells will include: trends in analytical data (e.g., Cr[VI], byproducts, and potentially TOC) collected from the TCS Recirculation Loop by-product monitoring wells located to the west of the TCS Injection Wells (Table 2.1-2); and comparison of groundwater elevation data/observed hydraulic gradients to model-predicted gradients."	corrections considered such as the 25' grid spacing and head loss due to skin/pump losses?				wells have shown, instead of due to improper design/ operation. The main concern continues to be that PG&E consultants may argue that an ever increasing number of wells are required to fix apparent problems, which are potentially just a misinterpretation of actual conditions. Sufficient time needs to be given to observe desired concentration trends before making rash decisions such as needing new wells in sensitive cultural areas. Based on this response, it is still unclear what steps will be taken to ensure proper interpretations and decisions are made to limit any new wells unnecessarily.	
685	FMIT/TRC	Non-design	GW Modeling	Append L Vol. 2 2.2.3/p. 2-9	"The decision statement for this DQO is: should extraction system operations or configuration be changed to optimize Cr(VI) migration control?"	This seems different than the actual TCS DQO-2 problem statement above. The question is now posed as an optimization problem and not just removing CrVI mass. If it is truly meant to be an optimization problem - then optimization criteria, constraints, and objectives should be clearly stated and discussed here. One key optimization criteria would be to maximize removal of CrVI in shortest possible time - so a following question is...how serious is the 30 year remedial time constraint in driving any 'optimization' of the TCS operations/configuration? How does the modeling fit into the optimization?	The text for this section was not intended to imply that operation of the TW bench extraction wells is a strong control on overall remedial timeframe, which is not anticipated. To clarify, the decision statement will be modified to match the problem statement: "The decision statement for this DQO is: should extraction system operations or configuration be changed to optimize improve Cr(VI) removal and migration control?"			This response remains unclear. Will all/some model(s) be used to run simulations aimed at optimizing extraction system to maximize removal of CrVI and to minimize plume migration/expansion? This sounds like a modeling optimization problem, which should be further clarified and restated.	PG&E Response: Assessment and optimizations of the performance of the TCS components will be driven by observed hydraulic and groundwater quality data in the field. The model can then be utilized to assess the potential long-term effects of the proposed adjustments or modifications.

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686	Hualapai/TRC	Non-design	GW Modeling	Append L Vol. 2 2.2.3/p. 2-9	"The decision statement for this DQO is: should extraction system operations or configuration be changed to optimize Cr(VI) migration control?"	This seems different than the actual TCS DQO-2 problem statement above. The question is now posed as an optimization problem and not just removing CrVI mass. If it is truly meant to be an optimization problem - then optimization criteria, constraints, and objectives should be clearly stated and discussed here. One key optimization criteria would be to maximize removal of CrVI in shortest possible time - so a following question is...how serious is the 30 year remedial time constraint in driving any 'optimization' of the TCS operations/configuration? How does the modeling fit into the optimization?	See above			This response remains unclear. Will all/some model(s) be used to run simulations aimed at optimizing extraction system to maximize removal of CrVI and to minimize plume migration/expansion? This sounds like a modeling optimization problem, which should be further clarified and restated.	See response 685
687	Cocopah/TRC	Non-design	GW Modeling	Append L Vol. 2 2.2.3/p. 2-9	"The decision statement for this DQO is: should extraction system operations or configuration be changed to optimize Cr(VI) migration control?"	This seems different than the actual TCS DQO-2 problem statement above. The question is now posed as an optimization problem and not just removing CrVI mass. If it is truly meant to be an optimization problem - then optimization criteria, constraints, and objectives should be clearly stated and discussed here. One key optimization criteria would be to maximize removal of CrVI in shortest possible time - so a following question is...how serious is the 30 year remedial time constraint in driving any 'optimization' of the TCS operations/configuration? How does the modeling fit into the optimization?	See above			This response remains unclear. Will all/some model(s) be used to run simulations aimed at optimizing extraction system to maximize removal of CrVI and to minimize plume migration/expansion? This sounds like a modeling optimization problem, which should be further clarified and restated.	See response 685
688	Chemehuevi/ TRC	Non-design	GW Modeling	Append L Vol. 2 2.2.3/p. 2-9	"The decision statement for this DQO is: should extraction system operations or configuration be changed to optimize Cr(VI) migration control?"	This seems different than the actual TCS DQO-2 problem statement above. The question is now posed as an optimization problem and not just removing CrVI mass. If it is truly meant to be an optimization problem - then optimization criteria, constraints, and objectives should be clearly stated and discussed here. One key optimization criteria would be to maximize removal of CrVI in shortest possible time - so a following question is...how serious is the 30 year remedial time constraint in driving any 'optimization' of the TCS operations/configuration? How does the modeling fit into the optimization?	See above			This response remains unclear. Will all/some model(s) be used to run simulations aimed at optimizing extraction system to maximize removal of CrVI and to minimize plume migration/expansion? This sounds like a modeling optimization problem, which should be further clarified and restated.	See response 685
689	DOI-100	Design	O&M	Appendix L, Vol.2; 2.2.4 Table 2.1-1 1st row p. 1(of 5)	If Cr(VI), arsenic, or manganese concentrations increase in surface water samples and are attributable to the Topock site…	Please add a footnote to this sentence that refers the reader to the discussion of how the determination of whether the Topock site is the source will be made.	The determination of whether the Topock site is the source will be made through a comparison of upstream sampling results with midstream and downstream sampling results, supported by Floodplain groundwater sampling results. This explanation will be added to Section 2.1 and referenced herein Table		Accepted.		Comment resolved pending DOI review of the final design documents.

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							2.1-1.				
690	FMIT/TRC	Non-design	GW Modeling	Append L Vol. 2 Table 2.1-1	"If hexavalent chromium concentrations are not decreasing within expected timeframes, operational changes (potentially including the addition of provisional IRZ wells) will be implemented per the process control decision rules (Figures 2.2-2 through 2.2-9)."	What are the "*expected timeframes*" and what is the basis? If models are updated during installation, startup, initial operation and for any 'operational' adjustments post- startup - will these "*expected timeframes*" also be updated and provided to stakeholders?	The expected timeframes are summarized in Tables 2.1-4 and 2.1-5, referenced herein Table 2.1-1 and were based on modeling results. Yes, updated expectations will be provided with model updates during remedy construction and operations.			Comment noted.	
691	Hualapai/TRC	Non-design	GW Modeling	Append L Vol. 2 Table 2.1-1	"If hexavalent chromium concentrations are not decreasing within expected timeframes, operational changes (potentially including the addition of provisional IRZ wells) will be implemented per the process control decision rules (Figures 2.2-2 through 2.2-9)."	What are the "*expected timeframes*" and what is the basis? If models are updated during installation, startup, initial operation and for any 'operational' adjustments post- startup - will these "*expected timeframes*" also be updated and provided to stakeholders?	See above			Comment noted.	
692	Cocopah/TRC	Non-design	GW Modeling	Append L Vol. 2 Table 2.1-1	"If hexavalent chromium concentrations are not decreasing within expected timeframes, operational changes (potentially including the addition of provisional IRZ wells) will be implemented	What are the "*expected timeframes*" and what is the basis? If models are updated during installation, startup, initial operation and for any 'operational' adjustments post- startup - will these "*expected timeframes*" also be updated and provided to stakeholders?	See above			Comment noted	

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					per the process control decision rules (Figures 2.2-2 through 2.2-9)."						
693	Chemehuevi/ TRC	Non-design	GW Modeling	Append L Vol. 2 Table 2.1-1	"If hexavalent chromium concentrations are not decreasing within expected timeframes, operational changes (potentially including the addition of provisional IRZ wells) will be implemented per the process control decision rules (Figures 2.2-2 through 2.2-9)."	What are the "*expected timeframes*" and what is the basis? If models are updated during installation, startup, initial operation and for any 'operational' adjustments post- startup - will these "*expected timeframes*" also be updated and provided to stakeholders?	See above			Comment noted.	
694	FMIT/TRC	Non-design	GW Modeling	Append L Vol. 2 Table 2.1-4	Model Predicted Cr(VI) Concentration Trend	Based on review of the 3rd quarter 2014 GW monitoring report data trends - several monitoring IM-3 monitoring wells showed increasing CrVI trends for several years (i.e. MW-40D, MW-47-115, MW-62-110, MW-66- 230, MW-69-195 etc.), probably due to redistribution from an imperfectly known plume distribution. Were such changes considered in the predicted trends provided in Table 2.1- 4 here? It seems likely similar redistribution effects will occur for years after starting remedial system operations, which aren't attributed to TOC effects? This table is referred to often and triggers important decisions on operations (and provisional wells) – how will these effects be considered? At a minimum, wouldn't this require updating and re-calibrating all 3 models (MicroFEM, Modflow, mt3d) and re-simulating the baseline 30 year + remediation scenario with new concentration distributions from all of the new data collection obtained during installation/monitoring? Could actual numerical values be indicated by year with some level of uncertainty instead of indicating "increasing/decreasing" to avoid premature and potentially incorrect operational/design changes? Shouldn't this table be updated after installation, when new monitoring data in many new locations/depths will become available? Model updates seem vague throughout 90% documents, occurring only if 'significant deviations' - but it seems essential to plan now to update all models so key decisions are made with the best possible predictions.	Table 2.1-4 was based on the baseline Cr(VI) distribution described in Section 2.2 of the BOD and did not assume any additional mass in areas noted based on recent concentration trends. Yes, there could be changes in Cr(VI) concentrations in the early data set as wells are installed and equilibrate. Yes, the Cr(VI) distribution data is a key part of the data that will go into the model updates during remedy construction and those model updates may change the expectations provided in Table 2.1-4. See comment # 667 for a discussion of numerical refinements of the expectations. More details on model update timing are provided in response to comment # 205.			The Tribes recommends that PG&E consultants quantify the duration of time they will wait to take actions (i.e., new wells, adjustment to extraction/injection rates etc.) and what their basis is. Again, Tribal concerns are that PG&E consultants may conclude that additional injection/ extraction and/or monitoring wells are required after limited and inadequate trend analysis (i.e., 1 to 3 years based on IM-3 data), where concentrations may deviate from currently modeled trends (i.e., increasing vs. decreasing, or changing at a rate much faster than expected) that are based on a flow model that has a number of flaws (i.e., see Prucha and Eggers, July 15, 2015 whitepaper) and are highly uncertain. In	DTSC response: Tribal comment noted. DTSC agrees that careful evaluation of data and trend would be priority.

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							PG&E will review and consider the Tribes' response (dated Sept 18 and 21, 2015) to PG&E's evaluation of the MW-X/Y White Paper (dated August 14, 2015). PG&E anticipates that additional discussion on a proposed path forward (including model improvements and timing) to occur at a future TWG.			reality, deviations may actually occur due to poor characterization of 3-d plume configuration/concentration distributions. No discussion is presented that details how this problem will be addressed.	
695	Hualapai/TRC	Non-design	GW Modeling	Append L Vol. 2 Table 2.1-4	Model Predicted Cr(VI) Concentration Trend	Based on review of the 3rd quarter 2014 GW monitoring report data trends - several monitoring IM-3 monitoring wells showed increasing CrVI trends for several years (i.e. MW-40D, MW-47-115, MW-62-110, MW-66- 230, MW-69-195 etc.), probably due to redistribution from an imperfectly known plume distribution. Were such changes considered in the predicted trends provided in Table 2.1- 4 here? It seems likely similar redistribution effects will occur for years after starting remedial system operations, which aren't attributed to TOC effects? This table is referred to often and triggers important decisions on operations (and provisional wells) – how will these effects be considered? At a minimum, wouldn't this require updating and re-calibrating all 3 models (MicroFEM, Modflow, mt3d) and re-simulating the baseline 30 year + remediation scenario with new concentration distributions from all of the new data collection obtained during installation/monitoring? Could actual numerical values be indicated by year with some level of uncertainty instead of indicating "increasing/decreasing" to avoid premature and potentially incorrect operational/design changes? Shouldn't this table be updated after installation, when new monitoring data in many new locations/depths will become available? Model updates seem vague throughout 90% documents, occurring only if 'significant deviations' - but it seems essential to plan now to update all models so key decisions are made with the best possible predictions.	See above			Hualapai recommend that PG&E consultants quantify the duration of time they will wait to take actions (i.e., new wells, adjustment to extraction/injection rates etc.) and what their basis is. Again, Hualapai concerns are that PG&E consultants rush into concluding that additional injection/extraction and/or monitoring wells are required after limited trend analysis (i.e., 1 to 3 years based on IM-3 data), where concentrations may deviate from currently modeled trends (i.e., increasing vs. decreasing, or changing at a much faster rate than expected), which are based on a flow model that has a number of flaws (i.e., see Prucha and Eggers, July 15, 2015 whitepaper) and is highly uncertain. And in reality, deviations may actually simply occur due to poorly characterization of 3-d plume configuration/ concentration distributions. No discussion is presented that details how this problem will be addressed..	See response 694
696	Cocopah/TRC	Non-design	GW Modeling	Append L Vol. 2 Table 2.1-4	Model Predicted Cr(VI) Concentration	Based on review of the 3rd quarter 2014 GW monitoring report data trends - several monitoring IM-3 monitoring wells showed increasing CrVI trends for several years (i.e. MW-40D, MW-47-115, MW-62-110, MW-66- 230, MW-69-195 etc.), probably due to redistribution from an imperfectly known plume distribution. Were such changes considered in the predicted trends provided in Table	See above			Tribes recommend that PG&E consultants quantify the duration of time they will wait to	See response 694

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					Trend	2.1- 4 here? It seems likely similar redistribution effects will occur for years after starting remedial system operations, which aren't attributed to TOC effects? This table is referred to often and triggers important decisions on operations (and provisional wells) – how will these effects be considered? At a minimum, wouldn't this require updating and re-calibrating all 3 models (MicroFEM, Modflow, mt3d) and re-simulating the baseline 30 year + remediation scenario with new concentration distributions from all of the new data collection obtained during installation/monitoring? Could actual numerical values be indicated by year with some level of uncertainty instead of indicating "increasing/decreasing" to avoid premature and potentially incorrect operational/design changes? Shouldn't this table be updated after installation, when new monitoring data in many new locations/depths will become available? Model updates seem vague throughout 90% documents, occurring only if 'significant deviations' - but it seems essential to plan now to update all models so key decisions are made with the best possible predictions.				take actions (i.e., new wells, adjustment to extraction/injection rates etc.) and what their basis is. Again, Tribal concerns are that PG&E consultants rush into concluding that additional injection/ extraction and/or monitoring wells are required after limited trend analysis (i.e., 1 to 3 years based on IM-3 data), where concentrations may deviate from currently modeled trends (i.e., increasing vs. decreasing, or changing at a much faster rate than expected), which are based on a flow model that has a number of flaws (i.e., see Prucha and Eggers, July 15, 2015 whitepaper) and is highly uncertain. And in reality, deviations may actually simply occur due to poorly characterization of 3-d plume configuration/ concentration distributions. No discussion is presented that details how this problem will be addressed.	
697	Chemehuevi/ TRC	Non-design	GW Modeling	Append L Vol. 2 Table 2.1-4	Model Predicted Cr(VI) Concentration Trend	Based on review of the 3rd quarter 2014 GW monitoring report data trends - several monitoring IM-3 monitoring wells showed increasing CrVI trends for several years (i.e. MW-40D, MW-47-115, MW-62-110, MW-66- 230, MW-69-195 etc.), probably due to redistribution from an imperfectly known plume distribution. Were such changes considered in the predicted trends provided in Table 2.1- 4 here? It seems likely similar redistribution effects will occur for years after starting remedial system operations, which aren't attributed to TOC effects? This table is referred to often and triggers important decisions on operations (and provisional wells) – how will these effects be considered? At a minimum, wouldn't this require updating and re-calibrating all 3 models (MicroFEM, Modflow, mt3d) and re-simulating the baseline 30 year + remediation scenario with new concentration distributions from all of the new data collection obtained during installation/monitoring? Could actual numerical values be indicated by year with some level of uncertainty instead of indicating "increasing/decreasing" to avoid premature and potentially incorrect operational/design changes? Shouldn't this table be updated after installation, when new monitoring data in many new locations/depths will become available? Model updates seem vague throughout 90% documents, occurring only if 'significant deviations' - but it seems essential to plan now to update all models so key decisions are made with the best possible predictions.	See above			Tribes recommend that PG&E consultants quantify the duration of time they will wait to take actions (i.e., new wells, adjustment to extraction/injection rates etc.) and what their basis is. Again, Tribal concerns are that PG&E consultants rush into concluding that additional injection/extraction and/or monitoring wells are required after limited trend analysis (i.e., 1 to 3 years based on IM-3 data), where concentrations may deviate from currently modeled trends (i.e.,	See response 694

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										increasing vs. decreasing, or changing at a much faster rate than expected), which are based on a flow model that has a number of flaws (i.e., see Prucha and Eggers, July 15, 2015 whitepaper) and is highly uncertain. And in reality, deviations may actually simply occur due to poorly characterization of 3-d plume configuration/ concentration distributions. No discussion is presented that details how this problem will be addressed.	
698	DOI-107	Non-design	Process	Section 2.2	Figure 2.2-2 through Figure 2.2-9	The text of Section 2.2 and the referenced flow charts imply that data evaluation per the flow charts and operational changes (if needed) occur whenever data is collected. However, most of the flow charts call for model recalibration or adjustment which seems onerous considering some data is collected on a monthly basis. Please clarify the frequency of data evaluation/operational adjustments including updating of the model.	The flow charts will be updated to clarify the timing of model updates as discussed in modeling Appendix B Section 12 and clarified in response to Comment #205. An additional paragraph will be added to Appendix B Section 12 to discuss the intended future use of the model including updating remediation time frame estimates, supporting capture zone analyses, and analyzing potential remedy design operation changes.		Accepted.		Comment resolved pending DOI review of the final design documents.
699	DTSC-147	Design	Monitoring	Operation and Maintenance Manual Volume 2 Sampling and Monitoring Plan / Appendix I, Page I-15		DTSC requests that the flow chart figures such as Fig 2.2-2, 2.2-4 and 2.2-9 where multiple monitoring aspects are presented on one interrelated figure be blocked out in some similar fashion as was done on the figures during the February 18, 2015 TWG meeting. DTSC had done this independently during the 60% and believes it will make the charts easier to understand, especially for those new or peripherally involved with this aspect of the project. Although the flow charts as presented are a frame work for O&M, these should be considered living documents that would potentially change based on operations. Note: Agencies are still in discussion regarding 60% design RTC 38 – short term goals which may lead to revisions of the Operation and Maintenance Manual Volume 2 Sampling and Monitoring Plan including longer term goals.	Comment noted. Similar blocking will be incorporated into the flow chart figures to provide additional clarity and will be included in the final design document. It is also recognized that the flow charts should be considered living documents.	Resolved.			Comment resolved.
700	FMIT/TRC	Non-design	GW Modeling	Append L Vol. 2 Figures 2.2-2 to 2.2-9		These monitoring decision framework diagrams point to many key decisions which are based on model-derived expected concentration ranges or trends (i.e., Tables 2.1-4, 2.1-5 and 2.2-1), but don't discuss when, how or which models need to be updated, nor whether these tables would then be updated and how long all of these decisions (short-term or long-term) will actually take. Based on Table 2.2-1, some decisions might take up to 30 years. It is recommended that decision time-frames be included in the framework diagrams, and more detail on when, how and which models will be updated. Use of models should be more frequent and iterative with any potential	The timing of model updates is provided in modeling Appendix B Section 12 and is clarified in response to comment 205. The timing of model updates			Noted.	

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						decisions here – which isn't really described well in Section 12 of Appendix B (model updates). These diagrams presumably show how critical decisions will be made – but don't show how tribal input is incorporated into the process.	will be incorporated into the flowcharts. The tables will be updated as part of the model updates. Although the tables indicate that some locations are expected to take 30 years to be treated, it is not meant to be implied that decisions on making operational changes would take 30 years. The comparison of results to anticipated timeframes and potential remedy changes will be evaluated in the 5 year review reports which will inform tribes, and this timing will be clarified on the flowcharts. Additional details on the avenues and protocols for tribal involvement are discussed in response to the overall comment on this topic, #44.				
701	Hualapai/TRC	Non-design	GW Modeling	Append L Vol. 2 Figures 2.2-2 to 2.2-9		These monitoring decision framework diagrams point to many key decisions which are based on model-derived expected concentration ranges or trends (i.e., Tables 2.1-4, 2.1-5 and 2.2-1), but don't discuss when, how or which models need to be updated, nor whether these tables would then be updated and how long all of these decisions (short-term or long-term) will actually take. Based on Table 2.2-1, some decisions might take up to 30 years. It is recommended that decision time-frames be included in the framework diagrams, and more detail on when, how and which models will be updated. Use of models should be more frequent and iterative with any potential decisions here – which isn't really described well in Section 12 of Appendix B (model updates). These diagrams presumably show how critical decisions will be made – but don't show how tribal input is incorporated into the process.	See above				
702	Cocopah/TRC	Non-design	GW Modeling	Append L Vol. 2 Figures 2.2-2 to 2.2-9		These monitoring decision framework diagrams point to many key decisions which are based on model-derived expected concentration ranges or trends (i.e., Tables 2.1-4, 2.1-5 and 2.2-1), but don't discuss when, how or which models need to be updated, nor whether these tables would then be updated and how long all of these decisions (short-term or long-term) will actually take. Based on Table 2.2-1, some decisions might take up to 30 years. It is recommended that decision time-frames be included in the framework diagrams, and more detail on when, how and which models will be updated. Use of models should be more frequent and iterative with any potential decisions here – which isn't really described well in Section 12 of Appendix B (model updates). These diagrams presumably show how critical decisions will be made – but don't show how tribal input is incorporated into the process.	See above				
703	Chemehuevi/ TRC	Non-design	GW Modeling	Append L Vol. 2 Figures 2.2-2 to 2.2-9		These monitoring decision framework diagrams point to many key decisions which are based on model-derived expected concentration ranges or trends (i.e., Tables 2.1-4, 2.1-5 and 2.2-1), but don't discuss when, how or which models need to be updated, nor whether these tables would then be updated and how long all of these decisions (short-term or long-term) will actually take. Based on Table 2.2-1, some decisions might take up to 30 years. It is recommended that decision time-frames be included in the framework diagrams, and more detail on when, how and which models will be updated. Use of models should be more frequent and iterative with any potential decisions here – which isn't really described well in Section 12 of Appendix B (model updates). These diagrams presumably show how critical decisions will be made – but don't show how tribal input is incorporated into the process.	See above				
704	DOI-101	Design	O&M	Appendix L,	Note, barium	It is not clear from the report whether sulfide is being sampled at the monitoring wells to make this	Laboratory		Resolved.		Comment resolved.

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				Vol.2; 4.1 p. 4-1.	concentrations are not predicted and are not anticipated to be significant unless strong sulfate reducing conditions develop	determination. Sulfate is being measured but it will not be possible to distinguish between iron reducing and sulfate reducing conditions without hydrogen sulfide data. Please clarify.	measurement of hydrogen sulfide to evaluate if sulfate reduction is occurring is not planned. In our experience, decreases in sulfate concentration are sufficient to determine whether sulfate reduction is occurring.				
705	FMIT/TRC	Design	Monitoring	Append L Vol.2 Sect. 4.2 and Table 2.2-1 Process Control Monitoring Program	Analytes	A full suite of cations, anions, and redox sensitive parameters are necessary for rapid geochemical assessment of groundwater remedy progress. For example, upconing of higher density water from the Mohave Basin could occur at the riverbank extraction wells, and chloride analyses could detect this occurrence. However, major ions (including chloride) would only be collected “as needed.”	The key redox sensitive parameters (e.g. nitrate, dissolved iron, dissolved arsenic) have been included in the sampling plan for evaluating the establishment of conditions for Cr(VI) treatment in the IRZ. With regards to cations and anions, previous analysis of density considerations due to salt concentrations for the remedy have not indicated that this is an important consideration for the project. Regardless, specific conductivity data will be collected during groundwater sampling that will be able to detect significant changes in salt concentrations. If this occurs, chloride or other cation/anion analysis can certainly be conducted under the "as needed" frequency designation.			Hexavalent chromium contamination at Topock is a chemistry problem, and the proposed remedy is a chemistry solution. But the chemistry solution is not being fully implemented. As the remedy is implemented, chemistry changes will occur to the aquifer over time that will require detailed analyses, modeling, and interpretation of geochemical changes. For example, ethanol may not be the carbon used for the entire remedy (the aquifer will become weary of ethanol), and there will be subtle changes in aquifer geochemistry that could only be described through persistent sampling and geochemical modeling. However, there seems to be a “seat-of-the-pants” approach being applied here. Such a large and important project should not be operated by seat-of-the-pants methods that can exacerbate significant impacts. Comment unresolved pending development of a plan to analyze major ions on a routine basis.	DTSC/DOI Response: Tribal comment noted.
706	Hualapai/TRC	Design	Monitoring	Append L Vol.2 Sect. 4.2 and Table 2.2-1 Process Control Monitoring Program	Analytes	A full suite of cations, anions, and redox sensitive parameters are necessary for rapid geochemical assessment of groundwater remedy progress. For example, upconing of higher density water from the Mohave Basin could occur at the riverbank extraction wells, and chloride analyses could detect this occurrence. However, major ions (including chloride) would only be collected “as needed.”	See above			Hexavalent chromium contamination at Topock is a chemistry problem, and the proposed remedy is a chemistry solution. But	See Response to RTC &705

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										the chemistry solution is not being fully implemented. As the remedy is implemented, chemistry changes will occur to the aquifer over time that will require detailed analyses, modeling, and interpretation of geochemical changes. For example, ethanol may not be the carbon used for the entire remedy (the aquifer will become weary of ethanol), and there will be subtle changes in aquifer geochemistry that could only be described through persistent sampling and geochemical modeling. Such a large and important project should be operated by the best possible methods. Comment unresolved pending development of a plan to analyze major ions on a routine basis.	
707	Cocopah/TRC	Design	Monitoring	Append L Vol.2 Sect. 4.2 and Table 2.2-1 Process Control Monitoring Program	Analytes	A full suite of cations, anions, and redox sensitive parameters are necessary for rapid geochemical assessment of groundwater remedy progress. For example, upconing of higher density water from the Mohave Basin could occur at the riverbank extraction wells, and chloride analyses could detect this occurrence. However, major ions (including chloride) would only be collected "as needed."	See above			Hexavalent chromium contamination at Topock is a chemistry problem, and the proposed remedy is a chemistry solution. But the chemistry solution is not being fully implemented. As the remedy is implemented, chemistry changes will occur to the aquifer over time that will require detailed analyses, modeling, and interpretation of geochemical changes. For example, ethanol may not be the carbon used for the entire remedy (the aquifer will become weary of ethanol), and there will be subtle changes in aquifer geochemistry that could only be described through persistent sampling and	See Response to RTC &705

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										geochemical modeling. However, there seems to be a seat-of-the-pants approach being applied here. Such a large and important project should not be operated by seat-of-the-pants methods. Comment unresolved pending development of a plan to analyze major ions on a routine basis.	
708	Chemehuevi/ TRC	Design	Monitoring	Append L Vol.2 Sect. 4.2 and Table 2.2-1 Process Control Monitoring Program	Analytes	A full suite of cations, anions, and redox sensitive parameters are necessary for rapid geochemical assessment of groundwater remedy progress. For example, upconing of higher density water from the Mohave Basin could occur at the riverbank extraction wells, and chloride analyses could detect this occurrence. However, major ions (including chloride) would only be collected "as needed."	See above			Hexavalent chromium contamination at Topock is a chemistry problem, and the proposed remedy is a chemistry solution. But the chemistry solution is not being fully implemented. As the remedy is implemented, chemistry changes will occur to the aquifer over time that will require detailed analyses, modeling, and interpretation of geochemical changes. For example, ethanol may not be the carbon used for the entire remedy (the aquifer will become weary of ethanol), and there will be subtle changes in aquifer geochemistry that could only be described through persistent sampling and geochemical modeling. However, there seems to be a seat-of-the-pants approach being applied here. Such a large and important project should not be operated by seat-of-the-pants methods. Comment unresolved pending development of a plan to analyze major ions on a routine basis.	See Response to RTC &705
709	DOI-102	Design	O&M	Appendix L, Vol.2; 4.2.9 p. 4-8.	The use of pressure transducers in monitoring wells will	Manual water levels should be collected occasionally from the wells equipped with the transducers to ensure that the transducer readings have not drifted from the true values.	The first paragraph of Section 4.2.9 will be modified as follows: The measurements will		Resolved.		Comment resolved.

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					facilitate the implementation of this method.		be made either by ~~manual methods or by use of dedicated~~ in-well pressure transducers and/or manual methods ~~in specific wells~~. The wells proposed to have in-well pressure transducers are noted on Tables 2.1-2 and 2.1-3 and selected based on their assigned function within the groundwater remedy (i.e., groundwater monitoring associated with groundwater extraction systems). For these wells, water level measurements will be periodically made by manual methods in addition to continuous pressure transducer readings. The water level measurements will be converted to elevations referenced to sea level so that the water levels can be integrated site-wide for interpretation of potentiometric levels and hydraulic gradients. Corrections to the water levels necessary due to salinity and temperature effects will be made as appropriate following standard operating procedures (SOP-A22, Procedures for Calculation of Freshwater Equivalent Heads Standard Operating Procedures for PG&E Topock Program). Tables 2.1-3 and 4.2-1 indicate the frequency of water level measurements.				
710	DOI-103	Design	O&M	Appendix L, Vol.2; 4.3.3.1 p. 4-11.	MW 33 090 / MW O: 0.0024 ft/ft MW H /MW 46 175: 0.0026 ft/ft MW D /MW 46 175: 0.0034 ft/ft	Please clarify whether transducers are being used to collected this data because if the wells are fairly close together and the gradients are this flat, likely errors in the measurements introduced by manual methods need to be eliminated.	MW-D is the only well listed in the well pairs that is not identified to have transducers in Tables 2.1-2 and 2.1-3.This will be corrected to add MW-D as a transducer well.		Accepted		Comment resolved pending DOI review of the final design documents.
711	DOI-104	Design	O&M	Appendix L, Vol.2; 4.3.3.1 p. 4-11.	MW 33 090 / MW O: 0.0024 ft/ft	The potentiometric maps that depict these gradients should be presented. The interpretation of these flat gradients with respect to the capture zone will also be complicated	The gradients for the well pairs were chosen based on groundwater		Resolved.		Comment resolved.

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					MW H /MW 46 175: 0.0026 ft/ft MW D /MW 46 175: 0.0034 ft/ft	due to the cyclic nature of the water levels that are impacted by the river stage. Please describe how this temporal nature of the water levels will be factored into the capture zone analysis. There should also be some discussion of how often these gradients will be checked and how the operation of the injection/pumping operations will be altered if these gradients are not maintained.	flow model runs as described in Section 4.3.3.1, p. 4-11. Regarding potential system operation changes as a result of observed gradients, the gradient thresholds for the identified monitoring well pairs are only a single line of evidence. As explained in Section 4.3.3, "a single line of evidence is not considered sufficient to demonstrate plume control because the uncertainties inherent to any single method are likely too great. Therefore, plume control is best demonstrated through multiple lines of evidence." Accordingly, injection/pumping operations will not necessarily be altered if the single-line-of-evidence threshold gradients for the identified well pairs are not maintained, which is consistent with DTSC comments during teleconferences discussing potential well pair analysis. Instead, the multiple lines of evidence approach will be employed to determine the potential need for operational changes. Therefore, these well pair gradients will be checked as part of hydraulic control assessments which will incorporate all of the lines of evidence discussed in Section 4.3.3. The method for addressing water level fluctuations due to river stage effects for the purpose of selecting representative water level elevations for hydraulic assessments is described in Section				

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							4.2.9. p. 4-8. Per DOI's request, Figures 711-1 and 711-2 (included in **Attachment P** of the final RTC table) are included to show the location of well pairs for model layers 3 and 4 as described in Appendix L, Volume 2, Section 4.3.3.1 that will be used for gradient analysis. The threshold gradients for the well pairs are in the cited section of the text.				
712	DOI-105	Design	O&M	Appendix L, Vol.2; 4.3.3. p. 4-10.	Interpretation of water levels Groundwater flow direction based on water level pairs / three point gradient analysis Groundwater flow direction based on water level contour maps	Is stream gauge data being used to assist in defining the groundwater surface water interactions? If so, it should be explained and if not, please discuss why not.	Stream gauge data can be useful in comparing river stage elevations to water levels in nearby wells monitoring the shallowest portion of the saturated zone (i.e., near the water table) to assess groundwater/ surface water interaction and to compare to any groundwater elevation contour maps generated to represent the water table. The referenced text will be changed as follows: 1. Interpretation of water levels • Groundwater flow direction based on water level pairs / three point gradient analysis and river stage measurements. • Groundwater flow direction based on water level contour maps (including river stage measurements).		Resolved.		Comment resolved.
713	DOI-106	Design	O&M	Appendix L, Vol.2; 4.3.3.1 p. 4-11.	Second, in lieu of having piezometers immediately adjacent to extraction wells, piezometers will be installed within the filter	This approach of trying to estimate water levels in the pumping wells with piezometers in the sand pack seems really difficult to justify. The actual well loss at a number of pumping rates and at different times would have to be established and even then the uncertainty would be high, particularly at these flat gradients. The EPA guidance cited in O&M Vol. 2 as the basis for the overall approach states: *"If a piezometer is not available near a pumping well, a possible approach (<u>until an appropriately located piezometer is available)</u> is to estimate aquifer water levels at the extraction well by correcting the measured water level for well losses. Bierschenk (1964) and Hantush (1964) presented a graphical method (see Exhibit 4) for determining head loss coefficients for well losses caused by turbulent flow across*	The proposal of having piezometers within the filter pack (outside of the well casing) is a technical solution to minimize the number of boreholes drilled at the site with consideration of the FEIR. If PG&E is directed to install		Resolved.		Comment resolved.

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					pack (outside of the extraction well casing) in some wells, and the difference between the water levels in the piezometer and in the extraction well casing during pumping will also aid in proper correction for well efficiency effects.	*the well screen, based on a plot of specific capacity versus pumping rate developed from a step-drawdown test. However, this approach incorporates the assumption that all well inefficiency results from turbulent flow near the well and in the well screen. Driscoll (1986) points out that other causes of well inefficiency are not accounted for in this approach. Dougherty (2003) presents another well loss estimation technique based on a recovery test in a pumping well. Note that well losses can change over time due to well fouling, further complicating the issue. <u>Again, locating piezometers near extraction wells is much preferred to correcting water levels in extraction wells based on calculated well losses.”</u>* It is DOI’s opinion that only piezometer data should be used to establish the water levels in order to predict capture zones.	piezometers in separate boreholes, this will add to the total borehole count for the project. Additionally, even though the filter pack would have associated head loss compared with the aquifer directly adjacent to the borehole, the water level in a piezometer within the filter pack will be more reliable than the operational water level within the well casing, and well testing can still be conducted to assess head loss occurring in the filter pack in order to estimate actual water level within the aquifer material. Also, piezometers located outside of well borings are not going to add any significant reliability to the model which will be used in conjunction with other lines of evidence to assess plume control.				
714	FMIT/TRC	Non-design	O&M	Append L Vol. 2 Section 5		The O&M manual ought to include monitoring of water levels in the Topock #2 & #3 and possibly other wells monitored as part of the 90% BOD Water Supply evaluation, to verify that long-term pumping at HNWR-1a does not cause long-term drawdowns at those wells. This is an issue regarding impacts, rather than an issue regarding protecting water quantity. Volume 2, Section 5, of the O&M plan does identify monitoring of water at wells #2 & #3, however, this is only for water quality. Therein, it stated that there exist co-operative agreements between PG&E and the well owners. The existence of such agreements ought to facilitate water level monitoring.	Topock Wells #2 and #3 are active water supply wells operated by Southwest Water Inc. Appendix N contains a technical memorandum titled *Addendum to the Summary of Findings Associated with the Evaluation of Alternative Freshwater Sources in the Topock Remediation Project Area* dated September 8, 2014. The fourth bullet on page 2 concludes that “72-hour constant-rate-extraction tests conducted during Phase I at both HNWR-1 and the Site B well suggest that neither will substantially adversely affect the production rates of existing nearby wells (see EIR Mitigation Measure WATER-1, Addendum No. 1)…” and “…pumping at HNWR-1A also will not			While the interpretation of test pumping may indicate no substantial future adverse impacts, all should recognize that, due to the various production wells in Arizona, local aquifer depletion is likely occurring and will occur, even if it not monitored or forecast from short-term test pumping. Therefore, This comment is considered unresolved.	DTSC response: Tribal comment noted. That is the reason for having a contingency source for fresh water.

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							substantially adversely affect the production rates of existing nearby wells.”				
715	Hualapai/TRC	Non-design	O&M	Append L Vol. 2 Section 5		The O&M manual ought to include monitoring of water levels in the Topock #2 & #3 and possibly other wells monitored as part of the 90% BOD Water Supply evaluation, to verify that long-term pumping at HNWR-1a does not cause long-term drawdowns at those wells. This is an issue regarding impacts, rather than an issue regarding protecting water quantity. Volume 2, Section 5, of the O&M plan does identify monitoring of water at wells #2 & #3, however, this is only for water quality. Therein, it stated that there exist co-operative agreements between PG&E and the well owners. The existence of such agreements ought to facilitate water level monitoring.	See above			While the interpretation of test pumping may indicate no substantial future adverse impacts, all should recognize that, due to the various production wells in Arizona, local aquifer depletion is likely occurring and will occur, even if it not monitored or forecast from short-term test pumping. Therefore, This comment is considered unresolved.	DTSC response: Tribal comment noted. That is the reason for having a contingency source for fresh water.
716	Cocopah/TRC	Non-design	O&M	Append L Vol. 2 Section 5		The O&M manual ought to include monitoring of water levels in the Topock #2 & #3 and possibly other wells monitored as part of the 90% BOD Water Supply evaluation, to verify that long-term pumping at HNWR-1a does not cause long-term drawdowns at those wells. This is an issue regarding impacts, rather than an issue regarding protecting water quantity. Volume 2, Section 5, of the O&M plan does identify monitoring of water at wells #2 & #3, however, this is only for water quality. Therein, it stated that there exist co-operative agreements between PG&E and the well owners. The existence of such agreements ought to facilitate water level monitoring.	See above			While the interpretation of test pumping may indicate no substantial future adverse impacts, all should recognize that, due to the various production wells in Arizona, local aquifer depletion is likely occurring and will occur, even if it not monitored or forecast from short-term test pumping. Therefore, This comment is considered unresolved.	DTSC response: Tribal comment noted. That is the reason for having a contingency source for fresh water.
717	Chemehuevi/ TRC	Non-design	O&M	Append L Vol. 2 Section 5		The O&M manual ought to include monitoring of water levels in the Topock #2 & #3 and possibly other wells monitored as part of the 90% BOD Water Supply evaluation, to verify that long-term pumping at HNWR-1a does not cause long-term drawdowns at those wells. This is an issue regarding impacts, rather than an issue regarding protecting water quantity. Volume 2, Section 5, of the O&M plan does identify monitoring of water at wells #2 & #3, however, this is only for water quality. Therein, it stated that there exist co-operative agreements between PG&E and the well owners. The existence of such agreements ought to facilitate water level monitoring.	See above			While the interpretation of test pumping may indicate no substantial future adverse impacts, all should recognize that, due to the various production wells in Arizona, local aquifer depletion is likely occurring and will occur, even if it not monitored or forecast from short-term test pumping. Therefore, This comment is considered unresolved.	DTSC response: Tribal comment noted. That is the reason for having a contingency source for fresh water.
718	DOI-284	Non-design	SOPs	Vol 2. Appendix A, General SOP Comment	SOPs	Throughout the SOPs there are several instructions of confirming with or contacting management for unusual conditions or operations but the management references are different. For example, there are references to the Site Operations Manager, the Maintenance Supervisor, Sr. Environmental Inspector, Project Manager, and sometimes just TCS Operations or PG&E. It is recommended the procedures are precise as to who to contact to eliminate any ambiguity. There should be a reference to the location of a listing of plant management personnel that includes their contact information.	Contact titles and information will be reviewed for consistency throughout the SOPs.		Resolved.		Comment resolved.

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719	DOI-301	Non-design	SOPs	Vol.2; Appendix A, Remedy-SOP-02_Rev0, 1/2		An equipment list section should be provided for this SOP to include PPE, fire extinguisher, funnel, broom, shovel, scoop, splash pads, etc.	This SOP is intended to provide general guidelines that will be followed during fueling/refueling activities in order to avoid spills and incidents. Each vendor/contractor is required to obtain approval from PG&E Topock Site Operations Manager, and/or Sr. Environmental Inspector of a) the planned fueling and re-fueling methods (including equipment to be used) for the contracted activities to be performed at the site, and b) the commercial fuel supplier prior to first use for contracted activities.		DOI concurs with the response.		Comment resolved.
720	DOI-302	Non-design	SOPs	Vol.2; Appendix A, Remedy-SOP-02_Rev0, 2/2	Inspect fuel conveyance hose/equipment and all connections and fittings for signs of wear or defects prior to the initiation of fuel pumping or pouring.	If hose/equipment show signs of defect, what are the next steps for the operator? It is presumed that the operator should report this to the Maintenance Supervisor.	See RTC #719 DOI-301. PG&E expects the vendor/contractor to propose this level of details in their proposal to be submitted to PG&E Topock Site Operations Manager, and/or Sr. Environmental Inspector for approval.		DOI concurs with the response.		Comment resolved.
721	DOI-303	Non-design	SOPs	Vol.2; Appendix A, Remedy-SOP-02_Rev0, 2/2	Inspect work area for any signs of spills, and remove spill pad(s), as appropriate	Are spill pads place ahead of time? Are these referred to as "splash pad" or "splash containment" elsewhere in the SOP? Consistent terminology should be use.	See RTC #719 DOI-301. PG&E expects the vendor/contractor to propose this level of details in their proposal to be submitted to PG&E Topock Site Operations Manager, and/or Sr. Environmental Inspector for approval.		Resolved.		Comment resolved.
722	DOI-304	Non-design	SOPs	Vol.2; Appendix A, Remedy-SOP-02_Rev0, 3/2	If a spill occurs the appropriate clean-up actions should commence …	Where are the "appropriate cleanup actions" defined?	See RTC #719 DOI-301. PG&E expects the vendor/contractor to propose this level of details in their proposal to be submitted to PG&E Topock Site Operations Manager, and/or Sr. Environmental Inspector for approval.		Resolved.		Comment resolved.
723	DOI-305	Non-design	SOPs	Vol.2; Appendix A, Remedy-SOP-02_Rev0, 3/2	Use a natural fiber push broom and/or a spark resistant shovel or scoop	Suggest either indicating where the equipment is located at the TCS or adding an Equipment section to the SOP and listing these items.	See RTC #719 DOI-301. PG&E expects the vendor/contractor to propose this level of details in their proposal to be submitted to PG&E		Resolved.		Comment resolved.

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							Topock Site Operations Manager, and/or Sr. Environmental Inspector for approval.				
724	DOI-108	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP -1A, p. 3 (of 7).	Install the pump with the intake 15 feet below the surface of the static water level.	Typically the wells are set at the midpoint of the well screen. The approach described in the SOP assumes that if there is greater than 15 feet of drawdown recovery rates will be relatively rapid. Please clarify if this is the expected case.	The cited text refers to sampling using the three-volume purge method and a temporary (non-dedicated) pump, at a well that does not have a dedicated pump or dedicated sampling tubing (which would already be set at an appropriate pump depth), or has not been previously sampled. In this case, the pump is set at a depth of 15 feet below the static water level (water surface in the well), *or* at a depth prescribed by the project manager or field team manager based on review of available data (e.g., previous sampling records, development log, well completion diagram, drilling log, etc.). If there is drawdown approaching 15 feet, the pumping rate would be adjusted. If necessary due to continued drawdown, the procedures given for "Low Yield and Poor Recovery Wells" on page 5 of this SOP would be followed instead.		Resolved.		Comment resolved.
725	DOI-109	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP -1A, p. 4(of 7).	Stabilization Criteria +/1 10% NTU units.	It's not just the stability of the parameters that is important for collecting representative samples, turbidity should be below 50 NTUs (as a rule of thumb) not to adversely affect the dissolved metals concentrations. Please address.	The SOP will be revised to include a turbidity stabilization target of 10 NTU or less before collecting samples, unless other parameters have already stabilized during extended purge, and turbidity, while trending flat, is still above 10 NTU.		Accepted.		Comment resolved pending DOI review of the final design documents.
726	DOI-110	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP -1A, p. 5(of 7).	Install the pump as previously described and start the purge.	For low recovery wells the pump should be set within the well screen. Please consider this option.	The text will be revised to read as follows: "Install the pump within the well screen or to ~~as~~ a previously ~~described~~ determined depth, and start the purge."		DOI concurs with the response.		Comment resolved.
727	DOI-111	Non-design	O&M	Appendix L,	Sampling all	Since this method prescribes the use of a peristaltic pump and a peristaltic pump will only work if	Currently, there is no		Accepted.		Comment resolved

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				Vol.2; Appendix A, SOP –A2, p. 1(of 6).	wells with a 1-inch diameter casing	the depth to water is less than 27 feet (at sea level); recommend including the option for a mini-bladder pump for the deeper water levels in the upland alluvial terrace areas (if any small diameter wells are planned).	plan for small diameter wells for the upland alluvial terrace areas. For flexibility, the SOP will be revised to add the option of using a mini-bladder pump in small-diameter wells in addition to peristaltic pump purge.				pending DOI review of the final design documents.
728	DOI-112	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP –A7, p. 2(of 2).	Required Documents	General recommendation - include each SOP required to complete the task under the Required Documents.	Applicable SOPs will be listed under the Required Documents as recommended.		DOI concurs with the response.		Comment resolved pending DOI review of the final design documents.
729	DOI-113	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP –A8, p. 2(of 3).	YSI meter	Should mention that the meter should be shielded from direct sunlight.	The following text will be added: "<u>During operation of the WQ meter, the screen on the handheld portion should be shielded from direct sunlight.</u>"		DOI concurs with the response.		Comment resolved.
730	DTSC-128	Non-design	SOPs	SOP-A12, O&M Volume 2, Appendix A, Page 2	"MEASUREMENTMEASUREMENT PROCEDURES:"	Correct typo. in heading cited	The redundant word "Measurement" will be removed.		Accepted.		Comment resolved.
731	DOI-114	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP –A18, p. 3(of4).	…the purge rate should equal the well recharge rate so there is limited drawdown in the well.	The SOP should present drawdown criteria – typically less than 1 foot is desired and the protocol if the drawdown targets are not being met.	The SOP will be revised to include a maximum 1-foot drawdown target. When the target drawdown is not met, a second set of criteria of reduced pumping rates at below 0.1 gpm will be added to the SOP.		DOI concurs with the response.		Comment resolved pending DOI review of the final design documents.
732	DOI-115	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP –A18, p. 3(of4).	HydraSleeve Deployment	The SOP should provide guidance on the diameter of the HydraSleeve to be used which is typically based on the well diameter. The water sample volumes should also be calculated so that it can be determined if multiple HydraSleeves are required.	The following text will be added in the "Preparation & Setup" section of the SOP: "<u>Evaluate the required sample volume and well construction to select the appropriate size (2-inch or 4-inch diameter) and number of HydraSleeve samplers for each well.</u>"		DOI concurs with the response.		Comment resolved.
733	DOI-116	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP –A22, p. 1(of5).	Procedures for Calculation of Freshwater Equivalent Heads	From a mathematical standpoint the calculations in the SOP are correct. However, using single point values for temperature and specific conductance fails to recognize the influence of density/temperature stratifications within the well. The errors caused by using a single point measurement may not be significant where the hydraulic gradients are relatively steep. In the floodplain, however, it appears even small errors could lead to misinterpretations of groundwater flow since the hydraulic gradients are so flat. Frequently, temperature and salinity profiling is done within the well if density variations are thought to be significant. Please address this concern.	PG&E uses salinity profile data to calculate freshwater equivalent heads for the key gradient control wells (MW-27-85, MW-31-135, MW-33-150, MW-34-100, and MW-45-95a) that are used to establish the landward gradient in the floodplain. There are	DTSC requests that PG&E provides in the next GMP report a technical memorandum/ analysis regarding the salinity correction procedures currently used at the site and describe the			Comment resolved pending DOI review of the final design documents.

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							three well pairs that are used to evaluate the landward gradients. One well (MW-45-95a) is common to two of the pairs, so there are a total of 5 wells where profiling rather than point measurements of SC is used in head calculations. The data for the key gradient wells provides a basis for evaluating the differences between heads calculated using single point measurements and head calculated using the salinity profile data from the same wells. These are all deep zone wells. The magnitude of the salinity adjustment is greater in deeper wells with a longer water column than in shallower wells. Based on recent data from 4th quarter 2014, the differences in freshwater equivalent heads calculated using the conductivity profiling data vs single-point conductivity measurements from samples collected after pumping range from 0.02 feet to 0.14 feet with an average of 0.07 feet. Note that well MW-45-95a is not routinely sampled so there are no recent single-point conductivity measurements available from this well. The differences quoted are from the other four wells, MW-27-85, MW-31-135, MW-33-150, and MW-34-100. Based on data from these four deep wells, it appears that single-point conductivity measurements provide freshwater equivalent head values that are comparable to those	comparison of profiling data vs single-point conductivity measurements at select wells.			

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							calculated using conductivity profiling. The conductivity profiles in the floodplain wells typically show a relatively uniform conductivity within the casing above the screen and a zone of significantly higher conductivity within the well screen or in the lower section of the wells screen (generally 20 foot screens). The single-point samples tend to have an intermediate value between the higher conductivity observed in the deeper screened interval and the lower conductivity within the blank well casing. This results in single-point conductivity measurements from samples collected after pumping being comparable to the average well profile conductivity that is calculated from conductivity profiling. During the past decade while these methods for salinity adjustments have been in use, detailed groundwater contour plots have been produced showing freshwater equivalent heads at three different depths in the floodplain. On these plots, the heads in the key gradient control wells are calculated based on profiling while the heads in the other wells are based on single point measurements. The gradient control wells contour in with the other wells nicely and the overall groundwater gradients have been stable and consistent over this time. The interpreted landward				

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							groundwater flow directions are supported by chromium trends and other geochemical data such the stable isotopes of oxygen and deuterium (See Performance Monitoring Reports from 2004 through 2009 [CH2M HILL] and Interim Measures Performance Monitoring and Site-Wide Groundwater and Surface Water Monitoring Report Reports, [CH2M HILL, 2009 through 2015]). In summary, hydraulic assessments, such as calculating horizontal hydraulic gradients between well pairs, or preparing potentiometric contour maps is always based on data from discretely screened monitoring wells (i.e., a mid-depth well is not compared to a deep well). Based on comparison of recent data for the key gradient control well pairs, the head differences associated with using conductivity profiles vs single-point conductivity measurements are small, averaging less than 0.1 ft. Therefore, using single point values provides a reasonable basis for freshwater equivalent head calculation in most wells.				
734	DTSC-129	Design	SOPs	SOP-A22, O&M Volume 2, Appendix A, Page 5	"It is assumed that: • The salinity of the water column in wells is constant throughout the water column."	Groundwater wells at the Topock site often exhibit salinity stratification. Groundwater well sampling is switching from three volume purge to low flow micropurge. TDS/SC data obtained from the micropurge technique may be less representative of the actual TDS/SC value for the water column as compared to three volume data. Therefore, the water level adjustment/correction may be less accurate and adversely affect groundwater interpretations. PG&E should evaluate this matter in detail and determine if a change in procedure is needed.	As described in response to RTC #733 DOI-116 above, the single-point conductivity measurements from micropurge samples are comparable to the average conductance from the conductivity profiles in the key gradient well pairs. Since the sampling method was switched from the three casing volume	See DTSC response to RTC #733 above. DTSC will continue to evaluate this item.			Comment resolved.

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							purge to micropurge in 2014, only small changes in SC have been observed (see Table 3-1 of the First Quarter 2015 Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report [CH2M HILL 2015]). PG&E will continue to compare the point sample SC measurements with the profile measurements in the key gradient wells and provide an evaluation of the data in the 2015 Annual GMP Report (available March 2016).				
735	DOI-285	Non-design	SOPs	Appendix L, Vol.2; Appendix A, SOP –A23, SCOPE/1	This procedure applies to all CH2M HILL personnel and subcontractors engaged in collecting environmental samples for the Topock environmental program.	The SOP should be applicable to all PG&E and PG&E contract personnel engaged in environmental sampling related to the groundwater remedy.	The cited text will be revised to read as follows: "This procedure applies to all PG&E personnel, contractors, and subcontractors engaged in collecting environmental samples related to Topock investigation and remedial activities"		DOI concurs with the response.		Comment resolved.
736	DOI-286	Non-design	SOPs	Appendix L, Vol.2; Appendix A, SOP –A23, Sample Collector/2	The Sample Collector shall be responsible for informing the FTL/SC of sampling conditions.	Sampling conditions should be documented. Where will this occur?	The cited text will be revised to read as follows: "The Sample Collector shall be responsible for informing the FTL/SC of sampling conditions <u>and record sampling conditions on the groundwater sampling log</u>".		DOI concurs with the response.		Comment resolved.
737	DOI-287	Non-design	SOPs	Appendix L, Vol.2; Appendix A, SOP –A23, Sample Custody/3	In some cases, samples may be hand-delivered to the laboratory.	Is this applicable to the Topock project. In which scenario will samples be hand-delivered to the laboratory?	Yes. Occasionally, project personnel already traveling by car to the city (e.g., drive from Needles to Las Vegas to catch a flight out of McCarran Airport) in which a laboratory is located (e.g., Asset Laboratory is located in Las Vegas) may hand-deliver samples to the laboratory to avoid the added expense of a		DOI concurs with the response.		Comment resolved.

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							special lab courier trip to the site, or holding samples for the next routine courier. This is done whenever practical to reduce carbon footprint and save cost.				
738	DOI-288	Non-design	SOPs	Appendix L, Vol.2; Appendix A, SOP –A23, Chain-of-Custody Record/4	• CH2M HILL address	Modify to PG&E/ Contractor address.	Text will be modified as requested.		DOI concurs with the response.		Comment resolved.
739	DTSC-130	Design	SOPs	SOP-A23, O&M Volume 2, Appendix A, Page 4	• "Container type, size and number (recommended*) • Preservatives used (recommended*)"	The Chain-of-Custody (CoC) Record section indicates that it is only recommended that preservation information and container type, size and number be entered on the CoC form. It seems that the information would be mandatory. An asterisk is associated with the recommendation, but does not appear to link to a footnote or other reference. Revision requested.	The notation of "(recommended*)" will be removed from these entries.				
740	DOI-289	Non-design	SOPs	Appendix L, Vol.2; Appendix A, SOP –A23, Overnight Sample Storage/5	The Topock field office trailer has a refrigerator that is dedicated to short-term sample storage, as well as two freezers that can be used for samples that require freezing.	It is unclear from the text if these freezers are used for other purposes. Samples should not be stored in freezers used for storage of food/items for human consumption. Freezers should be marked appropriately.	The sample storage refrigerator in the Topock field office trailer and two freezers in the temperature controlled storage connex are currently marked as "Samples Only – No Food". Additional freezers that might be used for sample storage will be marked accordingly.		DOI concurs with the response.		Comment resolved.
741	DOI-117	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP –C1, p. 3(of8).	Install the PT at least 5 feet below current depth to groundwater.	The 5 foot specification is fine but the SOP should make it clear the depths should be minimized (below 5 feet) in order to reduce the problems that arise with calculating freshwater heads when the density/temperature is stratified within the well.	As stated in RTC #733 DOI-116, well profiling data shows that the density/ temperature stratification present within each of the short screen monitoring wells that are instrumented with pressure transducers is not expected to be significant, therefore, problems associated with the depth pressure transducers are installed is not expected. However, to address this concern, SOP –C1, p. 3(of8) #3 will be revised to state: "Install the PT at least 5 feet below the				

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							current depth to groundwater, but no more than 15 feet below the current depth to groundwater, unless the monitoring well is located near a pumping well. If the monitoring well is located near a pumping well, install the transducer at least 5 feet below the maximum expected pumping depth to water see step 4 below.”				
742	DTSC-131	Non-design	SOPs	SOP-C1, O&M Volume 2, Appendix A, Page 8	POINTS OF CONTACT FOR QUESTIONS CONCERNING THESE PROCEDURES:	Will the point of contact information remain the same for the 90% design? If there is a change, what will the procedures be to ensure the SOPs stay current at all times through remedy? This applies to other SOPs as well (e.g., SOP-C2).	The POC information is current. It is the responsibility of the PG&E Construction Manager (or designee) and the PG&E Topock Site Operations Manager (or designee) to maintain the SOPs. PG&E staff will have the latest Standard Operating Procedures (SOPs) on file at the site. As stated in Section 1 of the O&M Manual Volume 1, material changes to the SOPs will be reported in the quarterly progress reports and updates will be made in a timely manner for proper implementation. It is anticipated that for administrative changes such as changes in POC information, a log of changes will be maintained by PG&E. For efficiency, administrative changes will be bundled and/or opportunistically combined with updates to incorporate material changes.	DTSC requests that all current SOPs and change logs be made available in the Topock SharePoint for agencies, stakeholders and Tribal information. It is critical for health and safety, as well as project communication that all participants have advance knowledge of the most current SOPs prior to field visits/monitoring events.			Comment resolved.
743	DOI-118	Non-design	O&M	Appendix L, Vol.2; Appendix A, SOP –L02, p. 1(of 2).	Ferrous Iron Analysis	In areas where the TOC has made a significant impact the ferrous iron concentrations can be very high and require several dilutions with the Hach method. Performing multiple dilutions can lead to significant errors. Recommend that after the proper dilution rate (e.g., 1:5, 1:10) is determined that the process be repeated to ensure accuracy.	Agree, this is consistent with current practice at Topock. This step will be emphasized by adding the following text to the SOP (shown in underline): “Common dilutions <u>(once a dilution has</u>		DOI concurs with the response.		Comment resolved.

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							been determined, a duplicate will be analyzed at the dilution determined):				
744	DTSC-132	Design	SOPs	SOP-L02, O&M Volume 2, Appendix A.		The SOPs for chemical methods, including this one, should touch on and document the analytical capabilities of the instrument to ensure that they are appropriate for the task at hand. For example, what are the typical detection limits and optimum analytical concentration range for the instrument? Suggest a section titled “Analytical Capabilities” between the Scope and Equipment sections. Could also add this information to Scope section as done for TDS (SOP-L19).	Agree, a discussion of the practical analytical range of the instrument will be added. However, to be complete, the discussion will also need to include dilutions and sample volume as factors that affect the analytical range.	Resolved.			Comment resolved.
745	DTSC-133	Design	SOPs	SOP-L04, O&M Volume 2, Appendix A, Page 2	“Confirm the calibration by checking the conductivity of the 1000 uS/cm standard at the beginning of each shift.”	The SOP for conductivity should be revised to also include calibration standards that approximate the fluid that will be measured. For example, some saline groundwater will yield much higher conductivities than the 1000 uS/cm standard currently proposed.	Agree. The manufacturer’s manual says the Conductivity probe is shipped with a 1000 µS/cm (at 25 °C) NaCl standard solution. For typical applications with conductivity of 0–10,000 µS (10 mS/cm), calibration will be done with this standard to achieve the accuracy specified for the meter. Outside this range, calibration will be done using a standard that lies closer to the measurement range. Additional steps will be added to the SOP to include a standard of 12,000 – 18,000 us/cm to calibrate for samples that exceed the 10,000 us/cm concentration. In addition, a standard in the general range of 25,000 – 45,000 us/cm will be used as a verification checked whenever a sample with greater than 20,000 us/cm is to be analyzed.	Resolved.			Comment resolved.
746	DTSC-134	Design	SOPs	SOP-L04, O&M Volume 2, Appendix A, Page 3	References	The two references included at the end of the SOP do not appear to be referenced within the document. Please revise appropriately.	There are no direct quotes, the listed references are listed as background reference material.	Resolved.			Comment resolved.
747	DTSC-135	Design	SOPs/*789+450	SOP-L10, O&M Volume 2, Appendix A, Page 1	“Number: IM3-SOP-L10 Rev01” “Turbidimeter kit (small blue tool box located in	Is the reference to IM3 in the number designation necessary for the 90% design? Suggest removing the IM3 reference if not needed. This applies to all similar SOP designations. This may create confusion when IM-3 is operating while remedy construction and sampling are also underway. One might assume the SOP is only for IM3. Details of the current IM3 set up (“blue tool box located in cabinet under counter below mixer”) do not seem appropriate and should be revised.	References to IM3 have been removed in the SOPs included in the 90% design submittal (September 2014). Reference to the “blue tool box located in	Resolved.			Comment resolved.

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					cabinet under counter below mixer)”		cabinet under counter below mixer” will be removed from SOP-L10.				
748	DTSC-136	Design	SOPs	SOP-L13, O&M Volume 2, Appendix A, Page 1	1. If the concentration is greater than 0.25 mg/L call the Project Chemist (Shawn Duffy) at 530-229-3303.	Will the Project Chemist information remain the same for the 90% design? If there is a change, what will the procedures be to ensure the SOPs stay current at all times through remedy? This applies to other SOPs as well. Also update item #2 listing groundwater sampling SOPs. The low flow SOP is not included. This applies to all other applicable SOPs as well (e.g., SOP-L01, -L02, -L03, -L04, -L09, -L14, -L15, -L16, -L17, L18, -L19).	Please see RTC #742 DTSC-131. SOPs A-18 (Minimum Drawdown) and A-19 (Hydrasleeve) will be added as requested.	Resolved.			Comment resolved.
749	DTSC-137	Design	SOPs7	SOP-L14, O&M Volume 2, Appendix A, Page 2	“Note: Turbid or colored samples must be filtered.”	Indicate what defines a turbid sample. Greater than 10 NTU??	Samples that have significant color or turbidity (e.g. noticeable by eye) should be filtered. That will be added as a part of the note requiring the filtering.	Resolved.			Comment resolved.
750	DTSC-138	Design	SOPs	SOP-L19, O&M Volume 2, Appendix A, Page 1	“The practical range of the method is 10 mg/L to 20,000 mg/L.”	Indicate what the operator should do if the sample is known or suspected to have a TDS concentration greater than 20,000 mg/L.	The cited text will be revised to read: “The practical range is 10 mg/L to 20,000 mg/L. <u>If TDS concentrations are greater than 20,000 mg/L then the sample can be diluted. If the sample is suspected to have a TDS concentration greater than 100,000 mg/L, the site analyst will consult with the Project Chemist.</u>”	Resolved.			Comment resolved.
Specific Comments – 90% BOD, Appendix L: O&M Manual -- Volume 3: Contingency Plan											
751	DOI-119	Non-design	O&M	1.0, p. 1-1	The following types of unacceptable conditions have been identified: **Category B: Schedule** — Failures that cause the schedule to achieving the groundwater remedy RAOs to be extended by more than 5 to 15 years.	Although some of the categories listed are fairly straightforward in assessing whether the conditions are met others are not. For instance, at what interim points in the process are evaluations made to assess whether remediation will be extended by more than 5 years and what are the triggering events? Please explain the overall approach.	In general, this type of evaluation is typically done during the technical assessment of the five-year reviews to be conducted by the agencies, to answer questions such as is the remedy functioning as intended by the decision documents, has any other information come to light that could call into question the protectiveness of the remedy, etc. Based on current projected construction and start-up schedule (Figure ES-2 of the BOD), the first five year review will occur approximately one year after the end of construction and start of				

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							O&M, therefore, in PG&E's opinion, the earliest timeframe for a meaningful evaluation would be during the second five year review. Outside of the five-year reviews, PG&E is obligated under the CD and CACA to report to DOI and DTSC, respectively, discovery of changes or events that might cause a delay to the schedule described in the progress reports. Depends on the nature and extent of the changes/events, such discovery could trigger an evaluation of potential effects to remediation timeframe. PG&E propose to discuss with the agencies on the merit/need for any follow-on evaluation.				
752	DTSC-148	Design	Contingencies	Operation and Maintenance Manual Volume 3 Contingency Plan 2.3 Freshwater Supply Page 2-2		Table 2.3-1 should be revised to include wells Topock 2 and 3 as contingent supply wells as well as potential installation of a new well along the planned HNWR-1A pipeline route. As discussed in other DTSC comments, the priority for Site B as a contingent well should be lowered. Use of Site B could also require chromium treatment as a contingency measure.	Table 2.3-1 is identical to Exhibit 3.3-2 of the 90% BOD. Revision to Exhibit 3.3.2 (RTC #274 DTSC-70) will be carried over to Table 2.3-1.	See response to RTC #274 regarding potential chromium treatment. See RTC #135 regarding possible well locations along the pipeline route.			Comment resolved.
753	DOI-120	Non-design	O&M	Table 2.1-1/9	Rising water levels in Colorado River	Potential flooding causes could include extreme rain events as well and should be considered when identifying mitigation.	Extreme rain events will be added as a potential cause for flooding. Mitigations for flooding caused by extreme rain events would be similar to those identified for flooding caused by rising water levels in Colorado River.		Accepted.		Comment resolved pending DOI review of the final design documents.
754	FMIT/TRC	Non-design	O&M	Append L Vol. 3 Sect. 5		The contingency plan in the O&M manual appears to not include planning for water quantity protection, other than for inadequate well yield at a single well - HNWR-1a in Table 2.3-1. That is, the contingency planning should be more encompassing to consider long-term climatic variations (that we are in the midst of) and water supply vulnerability to climate change. Given the 30-yr (+/-) operational timeline, contingency planning should explicitly consider larger impacts to water quantity, e.g., due to long-term regional drought.	PG&E has recently provided a response to a question regarding the potential effects of a prolonged drought on AZ water supply and the remedy process via an email from Yvonne Meeks/PG&E to Doug Bonamici/CRIT, titled Re; February TWG Action Item and dated March 24, 2015. The questions and responses are stated			Please add the provided note to Table 2.3-1. With that addition, this comment is considered resolved.	Comment resolved.

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							as follows: "1.) Are you saying severe drought will not adversely affect remedy flow characteristics as it operates, and, *PG&E Response:* That's correct, PG&E professional judgment is that potential future drought conditions would not be expected to significantly impact the remedy flow characteristics as it operates, and therefore the remedy performance or simulated timeframes. The remedy doesn't depend on local precipitation for its function. 2) That a prolonged drought is unlikely to reduce/impair the availability of Arizona freshwater supply so much that it would jeopardize the remedy process? *PG&E Response*: Again correct, as long as there is flow in the Colorado River, then the remedy is expected function as designed (including the availability of freshwater from Arizona). The aquifer on both sides of the river Topock is fed by the Colorado River and the river is highly controlled by the dams upstream. So as long as there is some water flowing in the Colorado River, there would be adequate water in the aquifer to support the pumping associated with the remedy. Although it has never happened, in an extreme drought there could possibly be curtailments on water usage in the Colorado River basin. That could cause PG&E,				

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							along with other water users, to have to reduce pumping – although we have water rights well in excess of planned pumping needs. A reduction in pumping would not result in a failure of the remedy. The natural hydraulic gradient would continue to move the plume through the IRZ even in the absence of pumping, just at a slower rate." If helpful, a note can be added to Table 2.3-1 to document the above information.				
755	Hualapai/TRC	Non-design	O&M	Append L Vol. 3 Sect. 5		The contingency plan in the O&M manual appears to not include planning for water quantity protection, other than for inadequate well yield at a single well - HNWR-1a in Table 2.3-1. That is, the contingency planning should be more encompassing to consider long-term climatic variations (that we are in the midst of) and water supply vulnerability to climate change. Given the 30-yr (+/-) operational timeline, contingency planning should explicitly consider larger impacts to water quantity, e.g., due to long-term regional drought.	See above			Please add the provided note to Table 2.3-1. With that addition, this comment is considered resolved.	Comment resolved.
756	Cocopah/TRC	Non-design	O&M	Append L Vol. 3 Sect. 5		The contingency plan in the O&M manual appears to not include planning for water quantity protection, other than for inadequate well yield at a single well - HNWR-1a in Table 2.3-1. That is, the contingency planning should be more encompassing to consider long-term climatic variations (that we are in the midst of) and water supply vulnerability to climate change. Given the 30-yr (+/-) operational timeline, contingency planning should explicitly consider larger impacts to water quantity, e.g., due to long-term regional drought.	See above			Please add the provided note to Table 2.3-1. With that addition, this comment is considered resolved.	Comment resolved.
757	Chemehuevi/ TRC	Non-design	O&M	Append L Vol. 3 Sect. 5		The contingency plan in the O&M manual appears to not include planning for water quantity protection, other than for inadequate well yield at a single well - HNWR-1a in Table 2.3-1. That is, the contingency planning should be more encompassing to consider long-term climatic variations (that we are in the midst of) and water supply vulnerability to climate change. Given the 30-yr (+/-) operational timeline, contingency planning should explicitly consider larger impacts to water quantity, e.g., due to long-term regional drought.	See above			Please add the provided note to Table 2.3-1. With that addition, this comment is considered resolved.	Comment resolved.
Specific Comments – 90% BOD, Appendix L: O&M Manual -- Volume 4: Soil Management Plan (As noted, this Soil Management Plan is the same as the C/RAWP Appendix L: Soil Management Plan. Therefore, comments from the C/RAWP on the same Soil Management Plan are presented here)											
758	FMIT/TRC 1r	Design	CEQA/EIR	1.2 Site Description, Soil Investigation History, and Findings	Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the EIR. In addition, mitigation measures will be implemented in accordance with the Programmatic Agreement (PA), the Cultural and Historic Properties	Many aspects of the final design will be determined using data collected early in the construction period. Please discuss whether a possibility exists that this newly collected data will result in infrastructure locations being changed to locations that are different than locations presented within the BOD reports. Any future deviations from the infrastructure locations as designated in the 100% design should require Tribal involvement at a level that has currently been established. Tribal consultation should not be limited to only the design process. Please change this language here and throughout the revised 90% BOD report to reflect a commitment to Tribal involvement in future design changes.	Please see RTCs #44 FMIT/TRC, #45 Hualapai/ TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC. Text will be revised as follows in response to this part of the comment: "Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the EIR. In addition, mitigation measures will be implemented in	See RTC #44.	DOI concurs with the response.	Please see response to comment FMIT/TRC RTC #44.	DTSC response: Tribal comment noted.

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					Management Plan (CHPMP), and the Cultural Impact Mitigation Program (CIMP), and in consultation with the Tribes throughout the design process.		accordance with the Programmatic Agreement (PA), the Cultural and Historic Properties Management Plan (CHPMP), and the Cultural Impact Mitigation Program (CIMP), and in consultation with the Tribes ~~throughout the design process~~."				
759	Hualapai/TRC 1r	Design	CEQA/EIR	1.2 Site Description, Soil Investigation History, and Findings	Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the EIR. In addition, mitigation measures will be implemented in accordance with the Programmatic Agreement (PA), the Cultural and Historic Properties Management Plan (CHPMP), and the Cultural Impact Mitigation Program (CIMP), and in consultation with the Tribes throughout the design process.	Many aspects of the final design will be determined using data collected early in the construction period. Please discuss whether a possibility exists that this newly collected data will result in infrastructure locations being changed to locations that are different than locations presented within the BOD reports. Any future deviations from the infrastructure locations as designated in the 100% design should require Tribal involvement at a level that has currently been established. Tribal consultation should not be limited to only the design process. Please change this language here and throughout the revised 90% BOD report to reflect a commitment to Tribal involvement in future design changes.	See above	See above	See above	See response to comment Hualapai/TRC RTC #83.	DTSC response: Tribal comment noted.
760	Cocopah/TRC 1r	Design	CEQA/EIR	1.2 Site Description, Soil Investigation History, and Findings	Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the EIR. In addition, mitigation measures will be implemented in accordance with the Programmatic	Many aspects of the final design will be determined using data collected early in the construction period. Please discuss whether a possibility exists that this newly collected data will result in infrastructure locations being changed to locations that are different than locations presented within the BOD reports. Any future deviations from the infrastructure locations as designated in the 100% design should require Tribal involvement at a level that has currently been established. Tribal consultation should not be limited to only the design process. Please change this language here and throughout the revised 90% BOD report to reflect a commitment to Tribal involvement in future design changes.	See above	See above	See above	See response to Cocopah RTC #84.	DTSC response: Tribal comment noted.

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					Agreement (PA), the Cultural and Historic Properties Management Plan (CHPMP), and the Cultural Impact Mitigation Program (CIMP), and in consultation with the Tribes throughout the design process.						
761	Chemehuevi/ TRC 1r	Design	CEQA/EIR	1.2 Site Description, Soil Investigation History, and Findings	Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the EIR. In addition, mitigation measures will be implemented in accordance with the Programmatic Agreement (PA), the Cultural and Historic Properties Management Plan (CHPMP), and the Cultural Impact Mitigation Program (CIMP), and in consultation with the Tribes throughout the design process.	Many aspects of the final design will be determined using data collected early in the construction period. Please discuss whether a possibility exists that this newly collected data will result in infrastructure locations being changed to locations that are different than locations presented within the BOD reports. Any future deviations from the infrastructure locations as designated in the 100% design should require Tribal involvement at a level that has currently been established. Tribal consultation should not be limited to only the design process. Please change this language here and throughout the revised 90% BOD report to reflect a commitment to Tribal involvement in future design changes.	See above	See above	See above	See Chemehuevi/TRC RTC #85.	DTSC response: Tribal comment noted.
762	DOI-121	Non-design	O&M	1/ Table 1.2-1	Constituents Exceeding Interim Screening Levels	Based on TCS-4 data, AOC 1 exceeds screening levels for dioxins and furans. These should be added. Constituents identified for AOC 4 do not include dioxins and furans. These were present in AOC4 prior to the removal action and should be included.	Dioxins and furans will be added to Table 1.2-1, Constituents Exceeding Interim Screening Levels, for AOC 1 and AOC 4. It will be noted that dioxin and furans were recently discovered in September 2013 near TCS-4 well and the extent of dioxin and furans in AOC 1 has not been evaluated.		DOI concurs with the response.		Comment resolved.

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763	DOI-122	Non-design	O&M	1/ Table 1.2-1	Analytical Suites	Based on TCS-4 data, AOC 1 exceeds screening levels for dioxins and furans. It is DOI's expectation that all samples in AOC 1 will now include these analytes. The AOC 4 analytical suite identified in the RFI/RI work plan includes dioxins and furans. Modify the table to include these constituents.	Dioxins and furans analysis will be added to Table 1.2-1, Analytical Suites, for AOC 1 and AOC 4.		DOI concurs with the response.		Comment resolved pending DOI review of the final design documents.
764	FMIT/TRC	Design	Remedial Design	Append L Vol. 4 Sect 2.2 p. 2-2		This section indicates a reasonable method for roll-off bins, however, the method (frequency of) for sampling soil stockpiles utilizes a non-standard reference that is not cited in the reference list. The reference should be provided. Further, the frequency for sampling stockpiles is much too low. For example, how would one obtain a representative and meaningful 4-point composite sample for such large stockpile volumes? This methodology, even if it is not likely to be used on the project, needs revision so that it is technically based.	The stockpile sampling frequency table provided in the text of this document was based on the sampling frequency table for waste characterization presented in the approved Work Plan for the Time-Critical Removal Acton at AOC 4. The reference for this table (Alisto et al., 2009) was provided in Section 2.2 in Volume 4 of the O&M Manual (Soil Management Plan). The following complete reference was included in the reference section of the Soil Management Plan: Alisto, Arcadis, CH2M HILL, NES, and Turnkey. 2009. *Work Plan for Time-Critical Removal Action at AOC 4*, Pacific Gas and Electric Company Topock Compressor Station, Needles, California. December. As noted in Section 2.2 of the SMP, most displaced soil will be pre-characterized following the Baseline SAP. Because stockpiles of soil that has not been pre-characterized greater than 500 CY are not expected the table has been deleted and text for this SMP has been modified as follows: "For stockpiles, one four point composite sample will be collected per 250 cubic yard".				Noted.
765	Hualapai/TRC	Design	Remedial Design	Append L Vol. 4 Sect 2.2 p. 2-2		This section indicates a reasonable method for roll-off bins, however, the method (frequency of) for sampling soil stockpiles utilizes a non-standard reference that is not cited in the reference list. The reference should be provided. Further, the frequency for sampling stockpiles is much too low. For example, how would one obtain a representative and meaningful 4-point composite sample for such large stockpile volumes? This methodology, even if it is not likely to be used on the project, needs revision so that it is technically based.	See above				

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766	Cocopah/TRC	Design	Remedial Design	Append L Vol. 4 Sect 2.2 p. 2-2		This section indicates a reasonable method for roll-off bins, however, the method (frequency of) for sampling soil stockpiles utilizes a non-standard reference that is not cited in the reference list. The reference should be provided. Further, the frequency for sampling stockpiles is much too low. For example, how would one obtain a representative and meaningful 4-point composite sample for such large stockpile volumes? This methodology, even if it is not likely to be used on the project, needs revision so that it is technically based.	See above				
767	Chemehuevi/ TRC	Design	Remedial Design	Append L Vol. 4 Sect 2.2 p. 2-2		This section indicates a reasonable method for roll-off bins, however, the method (frequency of) for sampling soil stockpiles utilizes a non-standard reference that is not cited in the reference list. The reference should be provided. Further, the frequency for sampling stockpiles is much too low. For example, how would one obtain a representative and meaningful 4-point composite sample for such large stockpile volumes? This methodology, even if it is not likely to be used on the project, needs revision so that it is technically based.	See above				
768	FMIT/TRC	Non-design	Request for Information	C/RAWP Append L 2.3 p. 2-3 Screening and Classification of Soil	If a CHHSL is not available, then the lesser of the USEPA residential regional screening level or the ecological comparison value is used.	The source document for the ecological comparison values should be included as an appendix to this section as it is referenced multiple times.	The ARCADIS Technical Memorandum 3: Ecological Comparison Values for Metals and Polycyclic Aromatic Hydrocarbons in Soil will be included as a new appendix (Appendix D) of this document.		DOI concurs with the response.	Noted.	
769	Hualapai/TRC	Non-design	Request for Information	C/RAWP Append L 2.3 p. 2-3 Screening and Classification of Soil	If a CHHSL is not available, then the lesser of the USEPA residential regional screening level or the ecological comparison value is used.	The source document for the ecological comparison values should be included as an appendix to this section as it is referenced multiple times.	See above		See above	Noted.	
770	Cocopah/TRC	Non-design	Request for Information	C/RAWP Append L 2.3 p. 2-3 Screening and Classification of Soil	If a CHHSL is not available, then the lesser of the USEPA residential regional screening level or the ecological comparison value is used.	The source document for the ecological comparison values should be included as an appendix to this section as it is referenced multiple times.	See above		See above	Noted.	
771	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP Append L 2.3 p. 2-3 Screening and Classification of Soil	If a CHHSL is not available, then the lesser of the USEPA residential regional screening level or the ecological comparison value is used.	The source document for the ecological comparison values should be included as an appendix to this section as it is referenced multiple times.	See above		See above	Noted.	
772	FMIT/TRC	Design	Remedial Design	Append L Vol. 4 Sect 2.4 p. 2-4		In this section, the definition of a "bed" needs to be specified so that all understand what is meant by a clay bed. For example, the minimum thickness needs to be agreed upon, so that equipment operators and Tribal monitors have a clear understanding of what will trigger the prescribed clay material handling protocol for a clay layer or stratum.	PG&E agrees that additional clarification would be beneficial; however, defining a "bed" based on a			Noted.	

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							specific minimum or maximum thickness is not practicable for the construction project given the various types of excavation that will occur. It is appropriate to define encountering a clay bed, and therefore the application of the clay handling protocol, in terms of being able to physically identify and separate the clay material from the rest of the cuttings or excavation soil. For example, when trenching with a backhoe it will be possible to identify relatively thin beds of clay material (e.g., less than a foot) and separate it from the rest of the excavated soil, but when drilling with a method that doesn't retrieve core that can be closely observed and precisely separated (e.g., hollow-stem auger) a relatively thin clay bed might not be identified or the clay material might become mixed with the rest of the cuttings to the point where it cannot be practicably separated. The text will be modified as follows: "Consistent with the special handling procedures requested by the Hualapai Department of Cultural Resources for displaced material generated from clay beds (this does not include clay-containing sediment mixtures, only clay beds), if clay bed(s) are encountered during construction, the clay material will be set aside on 100% cotton muslin (dye free) for future disposition following discussions with the Tribes. <u>For the purpose</u>				

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							of this project the identification of a "clay bed", and therefore the application of this special handling procedure, will be based on the practicability for the clay material to be separated from other excavated soils or drill cuttings. For example, when trenching with a backhoe it will be possible to identify relatively thin beds of clay material (e.g., less than a foot) and separate it from the rest of the excavated soil, but when drilling with a method that doesn't retrieve core that can be closely observed and precisely separated (e.g., hollow-stem auger) a relatively thin clay bed might not be identified or the clay material might become mixed with the rest of the cuttings to the point where it cannot be practicably separated. PG&E will notify the Agencies and Tribes in the event clay material is encountered and separated for storage.				
773	Hualapai/TRC	Design	Remedial Design	Append L Vol. 4 Sect 2.4 p. 2-4		In this section, the definition of a "bed" needs to be specified so that all understand what is meant by a clay bed. For example, the minimum thickness needs to be agreed upon, so that equipment operators and Tribal monitors have a clear understanding of what will trigger the prescribed clay material handling protocol for a clay layer or stratum.	See above				
774	Cocopah/TRC	Design	Remedial Design	Append L Vol. 4 Sect 2.4 p. 2-4		In this section, the definition of a "bed" needs to be specified so that all understand what is meant by a clay bed. For example, the minimum thickness needs to be agreed upon, so that equipment operators and Tribal monitors have a clear understanding of what will trigger the prescribed clay material handling protocol for a clay layer or stratum.	See above				
775	Chemehuevi/ TRC	Design	Remedial Design	Append L Vol. 4 Sect 2.4 p. 2-4		In this section, the definition of a "bed" needs to be specified so that all understand what is meant by a clay bed. For example, the minimum thickness needs to be agreed upon, so that equipment operators and Tribal monitors have a clear understanding of what will trigger the prescribed clay material handling protocol for a clay layer or stratum.	See above				
776	DOI-123	Non-design	O&M	3./3-1	In addition to these primary hazardous waste storage locations, PG&E may also store hazardous waste at the facilities at Moabi Regional Park.	It is the agencies expectation that storage of hazardous waste will not occur in the area of Park Moabi. Hazardous waste storage should occur on PG&E property. This applies to the language in Section 3.5 as well.	The cited sentence will be deleted in Sections 3.1 and 3.5.		Accepted.		Comment resolved pending DOI review of the final design documents.

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777	DTSC-149	Design	O&M	Operation and Maintenance Manual Volume 4 Soil Management Plan 3.1.2 Stockpiles Page 3-2	**"RCRA and non-RCRA Hazardous Soil.** Stockpiling of RCRA and non-RCRA hazardous waste/soil is not planned. It is anticipated that all soil that is above soil screening levels will be placed in roll-off bins or similar containers. If it is necessary to temporarily stockpile soil classified as RCRA or non-RCRA hazardous waste for up to 90 days to facilitate characterization or staging for offsite transportation … **Non-Hazardous Soil Above Interim Screening Levels.** It is anticipated that all soil that is above soil screening levels will be placed in roll-off bins or similar containers."	DTSC agrees with PG&E's preference to contain all contaminated soil (including hazardous waste) in roll-off bins. However, the third sentence referenced on the adjacent column (highlighted for emphasis) to "temporarily stockpile" hazardous waste is not allowed pursuant to hazardous waste management law. The only authorized methods for accumulating hazardous waste on-site for less than 90 days under generator status are specified in Title 22, Section 66262.34(a)(1). The referenced sentence must be removed from the design. In addition, PG&E should notify and receive agencies approval prior to stockpiling soil above screening levels at other locations than those pre-specified for soil storage and staging areas. Furthermore, proper records must be maintained so that the locations and quantities of soil piles can be tracked.	Under California Health and Safety Code Section 25123.3 (b)(4)(B), a generator is permitted to temporarily stockpile hazardous waste soil for up to 90 days for the purposes of offsite transportation if certain requirements are met. In response to DTSC's comment, Section 3.1.2 (Stockpiles) of the O&M Volume 4, Soil Management Plan, will be revised as follows. After the sentence "Hazardous waste stockpiles shall use a minimum 20-mil liner if constructed on a foundation (e.g., pavement or compacted soil) or a 60-mil liner if constructed in a location without a foundation (e.g., unpaved, un-compacted soil)", the following sentence will be added. "Stockpiled soil will not contain free liquids." The following sentence will be added to the end of Section 3.1.2. "After the final volume of stockpiled soil has been removed, the area will be inspected for visual contamination due to stockpiling activities, and any remaining residual contaminated material will be removed." The following text will be added to Appendix C, Construction and Operations Best Management Practices (BMPs) Plan for Soil Storage, Section 1.3, Stockpile Management Control BMPs: **Non-RCRA Hazardous Soil.** It is anticipated that non-RCRA hazardous soil will be placed in roll-off	DTSC agrees with PG&E's citation of the provision in the California Health and Safety Code for temporary stockpiling (less than 90 days) of non-RCRA hazardous waste. However, the cited requirements for compliance with temporary stockpiling of non-RCRA hazardous waste provision are not fully specified in Section 3.1.2. In particular, 25123.3(b)(4)(B)(ii) and (vi). Furthermore, discussion regarding stockpiling of hazardous waste (RCRA or non-RCRA) is absent from Appendix C, BMP for soil storage, section 1.3, Stockpile Management. Finally, PG&E must comply with H&SC 25123.3 for the purpose of the remedy if carried forward.			Comment resolved.

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							bins or similar containers. If it is necessary to temporarily stockpile non-RCRA hazardous soil the following BMPs will be followed: • Stockpiles will be constructed with liners and perimeter berms to prevent release or infiltration of liquids Minimum 20 mil polyethylene sheeting or equivalent will be used for liners if the stockpile is on a foundation, or minimum 60 mil polyethylene sheeting or equivalent will be used if the stockpile is not on a foundation. • Wind erosion will be prevented by use of a cover, applying SoiltacR or a similar soil stabilization product, or other suitable means. If a cover is employed it will be minimum 6 mil polyethylene sheeting or equivalent. • The perimeter berm will be constructed of clean materials (such as hay bales or straw wattle under the liner). • If a cover is employed, it shall extend over the outer edges of the perimeter berm and liner so that rainfall is prevented from entering the stockpile. • Covers and perimeter berms will be secured in place when not in use and at the end of				

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							each workday and as necessary to prevent wind dispersion or runoff from precipitation events. • Only soil that does not contain free liquids will be stockpiled. • Liquids that accumulate inside the berm will be pumped from the stockpile to a container or tank for characterization and disposal. • If the stockpile is outside of a secured area, the stockpile will be demarcated with barricades, orange cones, and/or caution tape until it is removed from the site. • Erosion control measures will be employed to prevent stockpiled soil from contributing to surface runoff and wind generated particulate matter. • The stockpile will be inspected weekly and after storms to verify that controls for windblown dispersion and prevention of runoff and run-on are functioning properly. • After the stockpile has been removed, the area will be inspected and all residual material shall be removed from the underlying and surrounding areas. • The stockpile location will be certified by a California-registered professional engineer				

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							for compliance with these requirements.				
778	DOI-124	Non-design	O&M	4.9/4-3	If the waste management facility is out-of-state, prior to the first shipment of waste material, PG&E will provide written notice for disposal of waste material at the listed facilities to the appropriate State environmental official in each receiving facility's State and the DOI Project Manager.	For consistency with the CD, please add "and shall comply with State law with regard to providing any further notifications. Additionally, PG&E shall notify the State environmental official referenced above and the DOI Project Manager of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. "	Addition will be made as requested.		Accepted		Comment resolved pending DOI review of the final design documents.
779	DOI-125	Non-design	Process	6/ 6-1	The SMP will be a "living document" that will continue to be updated as new information is obtained through the Soil RFI/RI investigations and as the groundwater remedy moves from the 90% design phase to the final design. An addendum to the SMP will also be prepared after the implementation of the Baseline SAP to document sampling results and refine soil classification volumes. And bullet 1: Goal is to	It is our expectation that the SMP be finalized and submitted with the 100% design package. As relevant screening levels are revised and cleanup levels are determined during the soil investigation and soil remedy decision-making process, an addendum to the SMP should be provided to update the screening levels for non-hazardous soil during future O&M activities. It is recommended that a supplemental document to the SMP rather than an addendum be provided to document sampling results and the refined soil classification volumes.	Section 6 text will be revised to read as follows: "The final SMP will be submitted with the final design documents. An addendum to the SMP will be prepared to update the screening levels for non-hazardous soil during future O&M activities. ~~a "living document" that will continue to be updated as new information is obtained through the Soil RFI/RI investigations and as the groundwater remedy moves from the 90% design phase to the final design. An addendum to the SMP~~ A data report will ~~also~~ be prepared after the implementation of the Baseline SAP to document sampling results and refine soil classification volumes." Bullet 1: …..~~Goal is to incorporate new information obtained from soil~~		Resolved.		Comment resolved.

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					incorporate new information obtained from soil investigations, as appropriate, into the SMP submitted for approval.		~~investigations, as appropriate, into the SMP submitted for approval. It is anticipated that soil investigations will commence in early 2015 prior to the start of groundwater remedy construction later in 2015.~~ Bullet 2: Prepare ~~an addendum to the SMP~~ a data report to present ~~incorporate~~ results from implementation of the Baseline SAP (as part of the groundwater remedy construction).				
780	FMIT/TRC	Design	Remedial Design	Append L Vol. 4 Appendix A	Attachment 1 Standard Operating Procedure B4	The procedures in this Standard Operating Procedure for Boring Abandonment appear to be completely at odds with what has been developed for injection/monitoring/ production hole abandonment and sealing. Revise this procedure so that it is consistent with the other procedure(s) and approach(s).	The older Standard Operating Procedure SOP-B4 (Boring Abandonment) will be removed from this document and replaced with Well-SOP-01 (Standard Operating Procedure for Well and Borehole Decommissioning), which is currently included in the C/RAWP. The same replacement will be made in Appendix L of the C/RAWP (Soil Management Plan).			Noted.	
781	Hualapai/TRC	Design	Remedial Design	Append L Vol. 4 Appendix A	Attachment 1 Standard Operating Procedure B4	The procedures in this Standard Operating Procedure for Boring Abandonment appear to be completely at odds with what has been developed for injection/monitoring/ production hole abandonment and sealing. Revise this procedure so that it is consistent with the other procedure(s) and approach(s).	See above				
782	Cocopah/TRC	Design	Remedial Design	Append L Vol. 4 Appendix A	Attachment 1 Standard Operating Procedure B4	The procedures in this Standard Operating Procedure for Boring Abandonment appear to be completely at odds with what has been developed for injection/monitoring/ production hole abandonment and sealing. Revise this procedure so that it is consistent with the other procedure(s) and approach(s).	See above				
783	Chemehuevi/ TRC	Design	Remedial Design	Append L Vol. 4 Appendix A	Attachment 1 Standard Operating Procedure B4	The procedures in this Standard Operating Procedure for Boring Abandonment appear to be completely at odds with what has been developed for injection/monitoring/ production hole abandonment and sealing. Revise this procedure so that it is consistent with the other procedure(s) and approach(s).	See above				
784	FMIT/TRC	Non-design	Monitoring	C/RAWP Append A OF Append L Sect. 2.0 p. A-2 Sampling and Analytical Approach	Because inorganic compounds are present in the fresh water at such low concentrations, soil underlying the pipeline would not be adversely	This conclusion is based on the assumption that groundwater quality from the HNRW wells will not change over time. It is possible however the arsenic or TDS can increase over the remedy duration and it is possible that the pipeline carrying this water will leak. Please comment on why this scenario is not considered a possible future risk.	There will be measures in place to assess quality of the freshwater source. Changes in fresh groundwater quality from Arizona fresh water well (HNWR-1A) will be monitored over time for the duration of the remedy. The monitoring frequency of the fresh			Noted.	

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Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					impacted by inorganic compounds from incidental releases, spills or leaks from the pipeline.		water source and the suite of analytes (arsenic and TDS included) are defined in O&M Manual Volume 2, Table 5.2-4. Applicable actions when changes in freshwater quality occur are defined as per Freshwater DQO-3 (DQO-3 Problem Statement: *The freshwater source will be monitored for changes in water quality over time.),* Figure 2.2-10 (Action Levels – Injection of Freshwater and Water Extracted from the River Bank), and Figure 2.2-11 (Protocol for Notification of Confirmed Exceedance of Action Level) (the referenced DQO and figures can be found in the O&M Manual Volume 2). Given the purpose of the freshwater in the Topock remedy, if water quality significantly deteriorates, it would no longer be suitable for the remedy and thus, no longer need to be transported via this pipeline. Nonetheless, the fresh water pipeline from the HNWR well will be constructed with HDPE pipe, a material that is highly resistant to leaks. All joints will be fused, and the pipeline will be hydrostatically pressure tested for leaks prior to use. Operational checks will also be in place to assess if leaks occur during remedy operation, such as instantaneous inflow and outflow totalizer readings and pressure measurements at the well head.				
785	Hualapai/TRC	Non-design	Monitoring	C/RAWP Append A OF Append L Sect. 2.0 p. A-2 Sampling and	Because inorganic compounds are present in the fresh water at	This conclusion is based on the assumption that groundwater quality from the HNRW wells will not change over time. It is possible however the arsenic or TDS can increase over the remedy duration and it is possible that the pipeline carrying this water will leak. Please comment on why this scenario is not considered a possible future risk.	See above			Noted.	

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				Analytical Approach	such low concentrations, soil underlying the pipeline would not be adversely impacted by inorganic compounds from incidental releases, spills or leaks from the pipeline.						
786	Cocopah/TRC	Non-design	Monitoring	C/RAWP Append A OF Append L Sect. 2.0 p. A-2 Sampling and Analytical Approach	Because inorganic compounds are present in the fresh water at such low concentrations, soil underlying the pipeline would not be adversely impacted by inorganic compounds from incidental releases, spills or leaks from the pipeline.	This conclusion is based on the assumption that groundwater quality from the HNRW wells will not change over time. It is possible however the arsenic or TDS can increase over the remedy duration and it is possible that the pipeline carrying this water will leak. Please comment on why this scenario is not considered a possible future risk.	See above			Noted.	
787	Chemehuevi/ TRC	Non-design	Monitoring	C/RAWP Append A OF Append L Sect. 2.0 p. A-2 Sampling and Analytical Approach	Because inorganic compounds are present in the fresh water at such low concentrations, soil underlying the pipeline would not be adversely impacted by inorganic compounds from incidental releases, spills or leaks from the pipeline.	This conclusion is based on the assumption that groundwater quality from the HNRW wells will not change over time. It is possible however the arsenic or TDS can increase over the remedy duration and it is possible that the pipeline carrying this water will leak. Please comment on why this scenario is not considered a possible future risk.	See above			Noted.	
788	DOI-126	Non-design	Other	Appendix A, Table A-1	AOC 1 Suite	Based on TCS-4 data, AOC 1 exceeds screening levels for dioxins and furans. It is DOI's expectation that all samples in AOC 1 will now include these analytes.	Dioxins and furans analysis will be added to the analytical suite on Table A-1.		DOI concurs with the response.		Comment resolved pending DOI review of the final design documents.
789	DOI-127	Non-design	Other	Appendix A, Table A-1		Table 1.2-1 identifies dioxins and furans in the analytical suite for AOCs 19, 14, 21 and 33 however they are not included in this table. Please address this inconsistency.	Table 1.2-1 identifies dioxins and furans in the analytical suite for AOCs 10, 14, 27 and 33. Dioxins and furans are not a COPC for AOC 19 or AOC 21. Table A-1 will be revised to included dioxins and furans in the		DOI concurs with the response.		Comment resolved pending DOI review of the final design documents..

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							analytical suite for AOCs 10, 27, and 33. AOC 14 is not included on this table because there is no planned groundwater remedy infrastructure within 20 feet of AOC 14.				
790	FMIT/TRC	Non-design	Request for Information	C/RAWP Append A OF Append L TABLE A-1 List of RFI/RI Investigation Areas within 20 feet of or that Overlap with Groundwater Remedy Infrastructure and Proposed Analyte Suite	AOC 1 - Area Around Former Percolation Bed Title 22 metals, hexavalent chromium, PAHs, pH, PCBs2	Why are dioxins and furans not included in the soil analysis? These contaminants were identified around TCS well 4 and may be present in the vicinity of this well. Please provide rationale for why these chemicals are not included within the analyte suite for AOC1.	Dioxins and furans were only recently discovered in AOC 1 during the initial assessment of TCS-4 well, and as such, were not included as part of the analytical suite for AOC 1. At DOI's request, Table A-1 will be updated and dioxin and furan analysis will be added as part of the analytical suite for AOC 1 groundwater remedy baseline sampling.		DOI concurs with the response.	Noted.	
791	Hualapai/TRC	Non-design	Request for Information	C/RAWP Append A OF Append L TABLE A-1 List of RFI/RI Investigation Areas within 20 feet of or that Overlap with Groundwater Remedy Infrastructure and Proposed Analyte Suite	AOC 1 - Area Around Former Percolation Bed Title 22 metals, hexavalent chromium, PAHs, pH, PCBs2	Why are dioxins and furans not included in the soil analysis? These contaminants were identified around TCS well 4 and may be present in the vicinity of this well. Please provide rationale for why these chemicals are not included within the analyte suite for AOC1.	See above		See above	Noted.	
792	Cocopah/TRC	Non-design	Request for Information	C/RAWP Append A OF Append L TABLE A-1 List of RFI/RI Investigation Areas within 20 feet of or that Overlap with Groundwater Remedy Infrastructure and Proposed Analyte Suite	AOC 1 - Area Around Former Percolation Bed Title 22 metals, hexavalent chromium, PAHs, pH, PCBs2	Why are dioxins and furans not included in the soil analysis? These contaminants were identified around TCS well 4 and may be present in the vicinity of this well. Please provide rationale for why these chemicals are not included within the analyte suite for AOC1.	See above		See above	Noted.	
793	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP Append A OF Append L TABLE A-1 List of RFI/RI Investigation Areas within 20 feet of or that Overlap with Groundwater Remedy	AOC 1 - Area Around Former Percolation Bed Title 22 metals, hexavalent chromium, PAHs, pH, PCBs2	Why are dioxins and furans not included in the soil analysis? These contaminants were identified around TCS well 4 and may be present in the vicinity of this well. Please provide rationale for why these chemicals are not included within the analyte suite for AOC1.	See above		See above	Noted.	

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				Infrastructure and Proposed Analyte Suite							
Specific Comments – 90% BOD, Appendix L: O&M Manual -- Volume 5: Health and Safety Plan											
794	FMIT/TRC	Non-design	Request for Information	Append L Vol. 5 HAZ-2	Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil : Soil that is excavated shall be loaded directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins. Suspected contaminated soils shall be segregated from suspected uncontaminated soils.	This statement is not consistent with the soil handling approach that was used during the old TCS-4 well. Please explain why this inconsistency in approach exists.	The approaches in these two documents vary because they describe two different circumstances where soil handling activities are required. The soil handling approach described in the Decommissioning Plan for Topock Compressor Station Well Number 4, (CH2M Hill, 2014) was developed in accordance with the Standard Operating Procedure (SOP) for Well and Borehole Decommissioning. This SOP is applicable during well and <u>borehole decommissioning activities (i.e. existing wells).</u> The SOP does not address soil handling procedures to be used during the drilling of new wells and/or boreholes in areas of suspected soil contamination. Conversely, the soil handling approach described in Appendix L, Volume 5 of the Operation and Maintenance Health and Safety Plan for the Ground Water Remedy,(PG&E, 2014) is specifically stated to be used "in the event that <u>drilling sites (i.e. new wells)</u> must be located within area of suspected soil contamination."			Noted.	
795	Hualapai/TRC	Non-design	Request for Information	Append L Vol. 5 HAZ-2	Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil : Soil that is excavated shall be loaded	This statement is not consistent with the soil handling approach that was used during the old TCS-4 well. Please explain why this inconsistency in approach exists.	See above			Noted.	

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins. Suspected contaminated soils shall be segregated from suspected uncontaminated soils.						
796	Cocopah/TRC	Non-design	Request for Information	Append L Vol. 5 HAZ-2	Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil : Soil that is excavated shall be loaded directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins. Suspected contaminated soils shall be segregated from suspected uncontaminated soils.	This statement is not consistent with the soil handling approach that was used during the old TCS-4 well. Please explain why this inconsistency in approach exists.	See above			Noted.	
797	Chemehuevi/ TRC	Non-design	Request for Information	Append L Vol. 5 HAZ-2	Reasonably Foreseeable Releases of Chemicals from Excavated or Disturbed Soil : Soil that is excavated shall be loaded directly into containers such as roll-off bins; dust suppression methods shall be used prior to and during loading of soils into the bins.	This statement is not consistent with the soil handling approach that was used during the old TCS-4 well. Please explain why this inconsistency in approach exists.	See above			Noted.	

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					Suspected contaminated soils shall be segregated from suspected uncontaminated soils.						
Specific Comments – SUPPLEMENTAL 90% Design Documents - Basis of Design Report/C/RAWP											
798	DTSC-178	Non-design	Editorial	Figure ES-14.		Details in Figure ES-14 are inconsistent with details of other figures (e.g. Figure 4.2-2 of the C/RAWP). Please explain the differences. If the differences are duration driven with Figure ES-14, this should be clarified so that it is easily understood that additional structures will be present.	DTSC is correct in that the differences in layout between BOD Figure ES-14 and C/RAWP Figure 4.2-2 are driven by duration—i.e., only long-term remedy support area structures/features are shown on Figure ES-14. This will be clarified on Figure ES-14.	Resolved.			Comment resolved.
799	DTSC-180	Non-design	CEQA/EIR: Cultural	Section 2/p 21 AND Appendix A11/p 124	Because the proposed soil storage and processing facilities are located outside the . . . APE . . .and the . . . (EIR, DTSC 2011) Project Area, additional surveys were completed to support the design. ---- "To comply with these requirements" [referencing EIR Mitigation Measures CUL-1b/c-1 and 1-b/c-2 and CUL-2; also PA and CHPMP].	Section 2 Page 21 correctly states that the proposed Park Moabi facilities are located outside the APE and the 2011 EIR Project Area and that is the reason additional surveys were required. However, Page 124 of supplemental 90% BOD states that archaeological surveys were conducted at Park Moabi in response to mitigation measures in the Groundwater EIR, and the PA and CHPMP. It is incorrect to cite the CEQA mitigation measure or the PA and CHPMP, which reference an APE that does not include the survey area, as the reason this additional survey was undertaken. Survey of potential additional project area is called for by non-project-specific regulations (e.g. PRC 5024 and 36 CFR 800). The wording of the rationale for the necessary survey should be revised.	PG&E undertook the additional surveys outside the current APE to support the design of the groundwater remedy in compliance with the PA, CHPMP, and the Project mitigation measures in the MMRP. To comply with various requirements of the PA and CHPMP, such as the requirement to avoid and/or minimize adverse effects, see PA Section III(B)(3)(b), PG&E needed to conduct the additional surveys in the area of the proposed soil storage and processing facilities. Because of this, it is appropriate to refer to the PA and CHPMP and not the Section 106 regulations (36 C.F.R. Part 800). See PA Recitals at 5:222-224 ("[A]ll Signatories and Invited Signatories agree that BLM, on behalf of the Federal Agencies, shall administer the Undertaking in accordance with the following stipulations to satisfy the Federal Agencies' Section 106 responsibilities for this Undertaking."). Similarly, the additional surveys outside the	Resolved.			Comment resolved.

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							current Project Area were completed to support the design in compliance with the Project mitigation measures. These mitigation measures require PG&E to assess the potential for construction to result in significant impacts on historically significant resources (CUL 1b/c 2) and to create a design that would avoid historical and archaeological resources to the maximum extent feasible (CUL 1b/c 1, CUL-2). PG&E could not make the required assessment or create a compliant design without the information provided by the additional surveys. DTSC's comment indicates the text on page 124 of Appendix A11 is ambiguous and needs clarification. PG&E will revise the text as follows: "To <u>support the design of the Project in compliance</u> with these requirements, PG&E retained Applied EarthWorks, Inc. (AE) as its Qualified Cultural Resources Consultant to conduct archaeological and historical field surveys of the additional locations considered for Project features in Moabi Regional Park."				
800	DTSC-181	Design	CEQA/EIR	Section 2.1.1.3/ Page 24	Sewage generated from the CHQ will be collected in two 10,000-gallon buried fiberglass-reinforced plastic tanks...The tanks will be emptied and removed sewage hauled offsite as	At Park Moabi, the proposed treatment for sewage and wastewater is to contain and remove it (water, sewer, fire protection are designed as stand-alone systems). PG&E also noted there may be some opportunity to connect with existing potable water and wastewater systems at Moabi Regional Park (if the County were to approve). Can PG&E provide more information on these potential alternatives to be included in the CEQA analysis?	In response to RTC #803 DOI-333, PG&E will provide a revised design for Park Moabi facilities which will include utility corridor information adequate for CEQA analysis.	Resolved.			Comment resolved.

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					needed, approximately monthly…						
801	DOI-331	Design	Remedial design	2.1.1.3/2-5	A booster pump and 15,000-gallon water storage tank located on the utility pad in the northwest portion of the CHQ yard will provide fire suppression water for the sprinkler system as well as to a fire hydrant located near the vehicle entrance to the long-term remedy support area.	Please indicate whether the electrical source for the booster pump will be outside of the area for potential fires.	While it is unlikely that a fire would occur near the booster pump electrical feeds, it is not possible to say that any area of the CHQ yard is outside of the area for potential fires. The booster pump is served by the main electrical feed provided by the City of Needles. A backup diesel-fueled electric generator located on the utility pad is also available to power the booster pump in the event of a failure of service on the City of Needles power line.		Noted.		Comment resolved.
802	DOI-332	Non-design	Process	2.1.2/2-6	Water will be transported to the soil processing area in portable tanks as needed…	Please discuss whether any additives, such as brine solutions (sodium and/or magnesium chloride), will be used for dust control and if so, potential impacts on revegetation efforts and groundwater quality.	While fugitive dust control will be conducted using mainly water, PG&E may also apply approved commercial dust control or soil stabilizing agents such as SoilTac (approved for use during and after the AOC 4 Time Critical Removal Action), PM10-50 (used at Hinkley Compressor Station), Gorilla-Snot, etc. Future commercially available products with comparable functionality may also be used, as appropriate.		Resolved.		Comment resolved.
803	DOI-333	Design	Infrastructures	2.1.3/2-6	The soil storage area, also comprising approximately 1.55 acres, will serve as the primary storage area for excavated soils…	Based on discussions with San Bernardino County, the adjacent leasee of Park Moabi Regional Park, and internal discussions between the Bureau of Land Management and the Department of the Interior, PG&E must find an alternate location for storage of waste soil above screening levels.	Based on further clarifications from DOI and BLM, PG&E understands that storage of waste soil above screening levels will not be allowed on federal lands. The remaining potential storage locations are private properties owned by FMIT and PG&E. Given the remedy facilities already planned to be located on the TCS and the Station's own operational needs for		Resolved.		This RTC was discussed at the July 23, August 19, and August 26 TWG meetings. Comment resolved.

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							the property for its natural gas compressor operations, there is only space on PG&E property to temporarily store soil bins while awaiting analysis prior to final disposition. There is not adequate space on PG&E property to store waste soil on a long term basis. PG&E also contacted local TSDFs and was told that the TSDFs would accept the waste soil for disposal, not for storage. Given the above, at this time, PG&E has not been able to identify an alternate location for storing the waste soil. PG&E defers to the FMIT regarding its views on potential use of the Tribe's property within the project area for this purpose. In the meantime, in response to this comment, PG&E will eliminate the proposed soil storage area at Moabi Regional Park and move the proposed CHQ into that area. Note that displaced soils that are below screening levels may still be stored at the currently proposed soil processing area and the CHQ (subject to space availability). The management protocol for handling and disposition of displaced site materials (Appendix C to the CIMP, Appendix B to the Soil Management Plan) was revised to reflect that the materials above screening levels will be disposed of offsite. The revised protocol was provided in this 90% RTC period and included in **Attachment Q** of the final RTC table.				
804	DOI-335	Non-design	Editorial	2.2/2-7	Water from this tank will be trucked to the	This section is entitled Operation & Maintenance Provisions. It may be assumed that the Agencies will have determined that the remedy is Operational and Functional and Operating Properly and Successfully prior to considering it in the O&M phase. Consequently, referencing the IM-3 facility	Reference to using IM-3 facility in this section was intended for		Resolved.		Comment resolved.

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					appropriate location (e.g., the existing IM-3 treatment plant or TCS evaporation ponds during remedy construction…	as an option for waste water management may be inappropriate in this section	remedy construction. Text will be revised to read as follows: "Decontamination/other wastewater management system – Decontamination of construction vehicles and equipment, including drill rigs; management of rainwater collected in the secondary containment; inspection/ maintenance of the sump pump; and offsite hauling of wastewater from the decontamination water storage tank. Water from this tank will be trucked to the appropriate location (e.g., the ~~existing IM-3 treatment plant or~~ TCS evaporation ponds ~~during remedy construction~~, or the Remedy-produced Water Conditioning Plant during and following remedy startup, or offsite) for management in accordance with the Waste Management Plan, <u>Section 6 of</u> ~~(Appendix R of the C/RAWP) and~~ Volume 1 of the O&M Manual." The following text will be added to Section 2.3 (Construction Approaches): "<u>Water from the decontamination water storage tank will be trucked to the appropriate location (e.g., the existing IM-3 treatment plant, the TCS evaporation ponds, or offsite) for management in accordance with the Waste Management Plan, (Appendix R of the C/RAWP)</u>."				
805	DOI-334	Design	Remedial design	2.3/2-8	The need for and final placement,	Provide additional detail regarding the provision that would trigger installation of a sound barrier adjacent to the construction zone (i.e, applicable standards for area next to Park Moabi).	As indicated in Section C.11 of Appendix C (Design Criteria), "the		Reference Appendix C and NOISE-2 MM in the		Comment resolved pending DOI review of the final design

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					orientation, size, and density of the noise barrier will be determined by a qualified acoustical consultant in accordance with the requirements of EIR Mitigation Measure NOISE-2 (DTSC 2011).		construction noise criteria will conform to San Bernardino Development Code and Mojave County standards, as well as the EIR mitigation measures NOISE-1, -2, and -3. Per San Bernardino County Code Division 3 Chapter 83.01.080, temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays, are exempt from noise limits." Regarding construction, NOISE-2 requires a sound barrier under the following conditions: "When construction activities are conducted within . . . 1,850 feet and 5,830 feet from California receptors and 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively[,] relative to noise-sensitive uses in the project area, noise measurements shall be conducted by a qualified acoustical consultant at the nearest noise-sensitive land use relative to the construction activities with a sound level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2) to ensure that construction noise associated with the project component complies with applicable daytime and nighttime noise standards. If noise levels are still determined to exceed noise standards, temporary barriers shall be erected as close to the construction		text and note the establishment of the disturbance coordinator Okay.		documents.

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							activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards.” The Moabi Regional Park mobile home area is considered a noise-sensitive use. The applicable daytime and nighttime noise standards are found in the San Bernardino Development Code. The Code states that the noise standard for residential uses is 55 dB(A) from 7:00 am to 10:00 pm and 45 dB(A) from 10:00 pm to 7:00 am. The noise standard for residential uses from adjacent mobile noise sources is 60 dB(A) on the exterior and 45 dB(A) on the interior. If ambient noise exceeds the noise standards, the noise standards are increased to reflect ambient noise levels. In addition, under the Code, certain sources of noise are exempt from regulation, including noise from temporary construction, maintenance, repair, and demolition activities that occur between 7:00 am and 7:00 pm, except Sundays and federal holidays. In compliance with Mitigation Measure NOISE-2, the evaluation and installation of sound barriers near construction activities is triggered by the distance between the activity and noise sensitive receptors, the applicable noise standard depending on the time of day of the activity, and the sound level attributable to the activity. In addition,				

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							PG&E has established a disturbance coordinator and commits to constructing the remedy in a manner that is safe, compliant with the law, respectful, and expedient. Consistent with this commitment, PG&E will also consider comments/inputs received regarding the construction activities in the decision to install sound barrier. Text will be added referencing the mitigation measure NOISE-2 and the noise disturbance coordinator.				
806	FMIT/TRC	Non-design	Request for Information	BOD Supp. 2.3 Construction Approaches p.2-8	Supplemental Section 2 If a temporary noise barrier is determined to be required during the construction phase (see C/RAWP Section 4.6.3 for details), it will comply with the EIR Noise Mitigation Measure NOISE-2c (DTSC 2011).	Please describe how visual impacts have addressed features such as a sound barrier.	As listed in BOD Supp. 2.3 the final size and location of the noise barrier will not be known until it is deemed necessary and designed by a qualified acoustical consultant. The noise barrier will be designed in accordance with EIR Mitigation Measure NOISE-2.	DTSC does not anticipate the need to erect noise barrier as a long term structure for the remedy; this may be a temporary solution as a result of a specific construction activity. If a longer term barrier is needed, DTSC and PG&E may evaluate the different options to minimize visual impacts once the need is defined or known.		A long term noise barrier within the Park Moabi area was not included in the original design and is considered a substantial design change not yet analyzed for potentially significant impacts. If a long term barrier is needed, the Tribes expects that it will be included and appropriately addressed within the future SEIR document	DTSC response: Tribal comment noted.
807	Hualapai/TRC	Non-design	Request for Information	BOD Supp. 2.3 Construction Approaches p.2-8	Supplemental Section 2 If a temporary noise barrier is determined to be required during the construction phase (see C/RAWP Section 4.6.3 for details), it will comply with the EIR Noise Mitigation Measure NOISE-2c (DTSC 2011).	Please describe how visual impacts have addressed features such as a sound barrier.	See above			A long term noise barrier within the Park Moabi area was not included in the original design and is considered a substantial design change. If a long term barrier is needed, Hualapai expects that it will be included and appropriately addressed within the future SEIR document.	DTSC response: Tribal comment noted.
808	Cocopah/TRC	Non-design	Request for Information	BOD Supp. 2.3 Construction Approaches	Supplemental Section 2 If a temporary	Please describe how visual impacts have addressed features such as a sound barrier.	See above			A long term noise barrier within the Park Moabi area was not	DTSC response: Tribal comment noted.

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				p.2-8	noise barrier is determined to be required during the construction phase (see C/RAWP Section 4.6.3 for details), it will comply with the EIR Noise Mitigation Measure NOISE-2c (DTSC 2011).					included in the original design and is considered a substantial design change. If a long term barrier is needed, the Tribes expect that it will be included and appropriately addressed within the future SEIR document.	
809	Chemehuevi/ TRC	Non-design	Request for Information	BOD Supp. 2.3 Construction Approaches p.2-8	Supplemental Section 2 If a temporary noise barrier is determined to be required during the construction phase (see C/RAWP Section 4.6.3 for details), it will comply with the EIR Noise Mitigation Measure NOISE-2c (DTSC 2011).	Please describe how visual impacts have addressed features such as a sound barrier.	See above			A long term noise barrier within the Park Moabi area was not included in the original design and is considered a substantial design change. If a long term barrier is needed, the Tribes expect that it will be included and appropriately addressed within the future SEIR document.	DTSC response: Tribal comment noted.
810	DTSC-179	Non-design	CEQA/EIR	Section 2.4/ Page 29	Entire Section 2.4: Anticipated Approvals, Authorization, and Permitting	No mention of potential issues with local (e.g. County of San Bernardino) authorities. If uses of Park Moabi for the remedy are not allowed, what are the alternatives for PG&E?	Based on discussions with BLM, DOI, and San Bernardino to date, with the exception of proposed soil storage, PG&E is not aware of any objections of local authorities to PG&E's proposal to using the areas for the CHQ and for soil processing.				
811	FMIT/TRC	Non-design	Request for Information	BOD Supp. 2.4 Anticipated Approvals, Authorization, and Permitting p.2-9	Supplemental Section 2 If a temporary noise barrier is determined to be required during the construction phase (see C/RAWP Section 4.6.3 for details), it will comply with the EIR Noise Mitigation	Please discuss why groundwater CEQA updates and approvals are not included within the anticipated approvals authorizations and permitting section. Also please indicate the decision matrix that will be used to determine if the previous groundwater FEIR adequately and completely addresses the groundwater remedy as presented within the 90% BOD.	As stated in Section 1 of the Supplemental 90%, for brevity, information presented in the September 2014 90% submittal that also applies to the components covered in this Supplemental 90% submittal is not repeated in the supplemental document. This includes CEQA review of the design by DTSC.	As announced, DTSC is proposing to complete a Subsequent EIR to evaluate potential impacts from design modifications between the 2011 EIR to the final design.		The Tribe looks forward to participating in the review of the SEIR	DTSC response: Tribal comment noted.

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					Measure NOISE-2c (DTSC 2011).		PG&E defers to DTSC for response to the second part of this comment.				
812	Hualapai/TRC	Non-design	Request for Information	BOD Supp. 2.4 Anticipated Approvals, Authorization, and Permitting p.2-9	Supplemental Section 2 If a temporary noise barrier is determined to be required during the construction phase (see C/RAWP Section 4.6.3 for details), it will comply with the EIR Noise Mitigation Measure NOISE-2c (DTSC 2011).	Please discuss why groundwater CEQA updates and approvals are not included within the anticipated approvals authorizations and permitting section. Also please indicate the decision matrix that will be used to determine if the previous groundwater FEIR adequately and completely addresses the groundwater remedy as presented within the 90% BOD.	See above	See above		Hualapai looks forward to participating in the review of the SEIR	DTSC response: Tribal comment noted.
813	Cocopah/TRC	Non-design	Request for Information	BOD Supp. 2.4 Anticipated Approvals, Authorization, and Permitting p.2-9	Supplemental Section 2 If a temporary noise barrier is determined to be required during the construction phase (see C/RAWP Section 4.6.3 for details), it will comply with the EIR Noise Mitigation Measure NOISE-2c (DTSC 2011).	Please discuss why groundwater CEQA updates and approvals are not included within the anticipated approvals authorizations and permitting section. Also please indicate the decision matrix that will be used to determine if the previous groundwater FEIR adequately and completely addresses the groundwater remedy as presented within the 90% BOD.	See above	See above		Tribes look forward to participating in the review of the SEIR.	DTSC response: Tribal comment noted.
814	Chemehuevi/ TRC	Non-design	Request for Information	BOD Supp. 2.4 Anticipated Approvals, Authorization, and Permitting p.2-9	Supplemental Section 2 If a temporary noise barrier is determined to be required during the construction phase (see C/RAWP Section 4.6.3 for details), it will comply with the EIR Noise Mitigation Measure NOISE-2c (DTSC 2011).	Please discuss why groundwater CEQA updates and approvals are not included within the anticipated approvals authorizations and permitting section. Also please indicate the decision matrix that will be used to determine if the previous groundwater FEIR adequately and completely addresses the groundwater remedy as presented within the 90% BOD.	See above	See above		Tribes look forward to participating in the review of the SEIR.	DTSC response: Tribal comment noted.
815	DTSC-182	Design	Infrastructures	3.1 Description, Design Basis,	"Updated Figures ES-4C	It does not appear that any of the figures illustrate the complete gas supply line run for the pond generators. Revision requested.	An inset will be added to these figures to show	Resolved.			Comment resolved.

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				and Assumptions. Page 3-1.	and 3.4-1 from the 90% BOD Report, Exhibit 2.7-1 from the O&M Volume 1, and Figure 3.1-4 of the C/RAWP…"		the southern extent of the gas supply line that connects to PG&E's natural gas Line 300B. The figures were revised during the 90% RTC period and included in **Attachment R** of the final RTC table.				
816	DTSC-183	Design	Infrastructures	3.4 Anticipated Approvals, Authorization, and Permitting Page 3-3.	"Rule 1160 applies to emergency, portable, standby, or stationary internal combustion engines with a rating equal to or greater than 500 brake horsepower (bhp). This rule is not anticipated to be applicable to the RICE. The applicability of Rule 219 section (E)(2)(a)3 will be further evaluated during the 100% design process."	It does not appear that applicability of Rule 219 has been completely assessed. Will significant design changes be required should it apply?	The generation equipment proposed for the TCS evaporation ponds is not subject to Rule 219 (b) (1) due to the generator having a maximum power rating of 49 Hp at the rated rpm. Rule 219 exempts internal combustion engines with a rating of 50 horsepower or less. Text will be revised to reflect the above.	Resolved.			Comment resolved.
817	FMIT/TRC	Design	Infrastructures	BOD Supp.	Supplemental Section 4	This evaluation and quite possibly the outcome thereof needs to be revised to seriously consider the option of utilizing the crossing that presently exists (a vented ford) with the underground utilities buried in the upstream channel adjacent to the crossing, together with limited improvements, such as grouted rip rap on the upstream and downstream faces of the crossing, and, possibly, a Portland Cement Concrete (PCC) slab to facilitate stability of the roadway during overtopping events.	As stated in RTC #19 FMIT-5, after further deliberation and consideration of all 90% comments received on this topic, PG&E changed the design of the northern BCW crossing to involve a) keeping the existing access road and b) burying the piping/ conduits within BCW and up-gradient of the existing access road. Similarly and concurrently, PG&E also changed the design of the southern BCW crossing to remove the aerial crossing and bury piping/conduit within BCW **(see Attachment C)**.			Comment resolved.	Comment resolved.
818	Hualapai/TRC	Design	Infrastructures	BOD Supp.	Supplemental	This evaluation and quite possibly the outcome thereof needs to be revised to seriously consider	See above				

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					Section 4	the option of utilizing the crossing that presently exists (a vented ford) with the underground utilities buried in the upstream channel adjacent to the crossing, together with limited improvements, such as grouted rip rap on the upstream and downstream faces of the crossing, and, possibly, a Portland Cement Concrete (PCC) slab to facilitate stability of the roadway during overtopping events.					
819	Cocopah/TRC	Design	Infrastructures	BOD Supp.	Supplemental Section 4	This evaluation and quite possibly the outcome thereof needs to be revised to seriously consider the option of utilizing the crossing that presently exists (a vented ford) with the underground utilities buried in the upstream channel adjacent to the crossing, together with limited improvements, such as grouted rip rap on the upstream and downstream faces of the crossing, and, possibly, a Portland Cement Concrete (PCC) slab to facilitate stability of the roadway during overtopping events.	See above				
820	Chemehuevi/ TRC	Design	Infrastructures	BOD Supp.	Supplemental Section 4	This evaluation and quite possibly the outcome thereof needs to be revised to seriously consider the option of utilizing the crossing that presently exists (a vented ford) with the underground utilities buried in the upstream channel adjacent to the crossing, together with limited improvements, such as grouted rip rap on the upstream and downstream faces of the crossing, and, possibly, a Portland Cement Concrete (PCC) slab to facilitate stability of the roadway during overtopping events.	See above				
821	FMIT/TRC	Non-design	Request for Information	BOD Supp. 4.1 Description, Design Basis, and Assumptions p.4-1	Supplemental Section 4 Improved drainage in the area will allow more flow, and thereby would both protect the road and embedded infrastructure and return BCW to a more natural state over time.	Please provide a detailed description of how improved drainage using the preferred design proposal will "return BCW to a more natural state over time". In addition within this description please indicate how the preferred alternative does a better job at returning BCW to a more natural state than any of the other options.	As stated in RTC #19 FMIT-5, after further deliberation and consideration of all 90% comments received on this topic, PG&E changed the design of the northern BCW crossing to involve a) keeping the existing access road and b) burying the piping/ conduits within BCW and up-gradient of the existing access road. Similarly and concurrently, PG&E also changed the design of the southern BCW crossing to remove the aerial crossing and bury piping/conduit within BCW. Therefore, this comment is considered moot given this proposed design change.			Noted.	
822	Hualapai/TRC	Non-design	Request for Information	BOD Supp. 4.1 Description, Design Basis, and Assumptions p.4-1	Supplemental Section 4 Improved drainage in the area will allow more flow, and thereby would both protect the road and embedded infrastructure and return BCW to a more natural state over time.	Please provide a detailed description of how improved drainage using the preferred design proposal will "return BCW to a more natural state over time". In addition within this description please indicate how the preferred alternative does a better job at returning BCW to a more natural state than any of the other options.	See above			Noted.	
823	Cocopah/TRC	Non-design	Request for	BOD Supp. 4.1	Supplemental	Please provide a detailed description of how improved drainage using the preferred design	See above			Noted.	

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			Information	Description, Design Basis, and Assumptions p.4-1	Section 4 Improved drainage in the area will allow more flow, and thereby would both protect the road and embedded infrastructure and return BCW to a more natural state over time.	proposal will "return BCW to a more natural state over time". In addition within this description please indicate how the preferred alternative does a better job at returning BCW to a more natural state than any of the other options.					
824	Chemehuevi/ TRC	Non-design	Request for Information	BOD Supp. 4.1 Description, Design Basis, and Assumptions p.4-1	Supplemental Section 4 Improved drainage in the area will allow more flow, and thereby would both protect the road and embedded infrastructure and return BCW to a more natural state over time.	Please provide a detailed description of how improved drainage using the preferred design proposal will "return BCW to a more natural state over time". In addition within this description please indicate how the preferred alternative does a better job at returning BCW to a more natural state than any of the other options.	See above			Noted.	
825	DOI-336	Design	Infrastructure	4.1/4-2 & 4.2/4-2	…the riprap and metal guard rails will also be stained to more closely match the surrounding natural colors. New riprap would be stained to match adjacent riprap.	It is unclear why stained riprap would be necessary if local materials are used.	Staining may be needed because the use of locally-sourced materials may not guarantee identical coloring. The colors may differ if the (locally-available) riprap source rock has a different color(s) than the existing soil and rock at the site. Even if they are from the same source material, the colors may differ because the newly-excavated riprap will have fresh cut faces, while the soil and rock exposed at the site has been subject to erosion and other weathering processes that affect color. PG&E recognizes that it is the preference of the land owner and/or manager as to whether the riprap is stained. PG&E will coordinate with land owner and/or manager on this item.		Resolved.		Comment resolved. This will be addressed by the individual landowner(s)/land manager.
826	DOI-337	Non-design	Editorial	4.1/4-2	In addition, in	Correction: CFDW should be CDFW	Correction will be made		Resolved.		Comment resolved.

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					compliance with the CFDW AMMs implemented …		as requested.				
827	DTSC-184	Design	Infrastructures	4.4 Evaluation of the TRC's Proposed Concept for BCW Crossing. Page 4-4.	• The proposed unvented ford would drastically alter the road profile which would violate PG&E's design criterion to keep the elevation and profile of the road surface at or near existing. - The design criterion was developed so that the features of the new crossing (such as elevation, width, slopes, etc.) would be similar to those of the existing service/access road to allow continued use by PG&E and other entities. Drastically altering the road parameters could negatively affect all users.	The cited bullet should be deleted or significantly revised. The bullet discusses the ford altering existing road profile, yet the section states, "*Both options of the ford concept, a vented ford and an unvented ford, would be similar to existing or past conditions at the Topock site.*" and "*the end result would look much like the unimproved ford that was used to cross the wash before the existing culverts were installed.*" Both statements indicate that little change would be expected from the ford design in direct contrast to the cited bullet. The RCB design seems to yield the greatest profile change.	As stated in RTC #19 FMIT-5, after further deliberation and consideration of all 90% comments received on this topic, PG&E changed the design of the northern BCW crossing to involve a) keeping the existing access road and b) burying the piping/ conduits within BCW and up-gradient of the existing access road. Similarly and concurrently, PG&E also changed the design of the southern BCW crossing to remove the aerial crossing and bury piping/conduit within BCW. Therefore, this comment is considered moot given this proposed design change.	Resolved.			Comment resolved.
828	DTSC-185	Design	Infrastructures	4.4 Evaluation of the TRC's Proposed Concept for BCW Crossing. Page 4-4.	"The fords would be overtopped by the 25-year 24-hr design storm event, which would violate PG&E's hydraulic design criterion. In other words, the fords	Regarding the latter highlighted sentence: As storm events are of short duration at the site, the cited bullet does not appear significant, especially since alternative access roads exist and could suffice for short durations. Are there any other design or operational justification that should be considered?	As stated in RTC #19 FMIT-5, after further deliberation and consideration of all 90% comments received on this topic, PG&E changed the design of the northern BCW crossing to involve a) keeping the existing access road and b) burying the piping/ conduits within BCW	Resolved.			Comment resolved.

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					would be impassable during the design storm event."		and up-gradient of the existing access road. Similarly and concurrently, PG&E also changed the design of the southern BCW crossing to remove the aerial crossing and bury piping/conduit within BCW. Therefore, this comment is considered moot given this proposed design change.				
829	DOI-338	Non-design	Process	Section 4.4/4-4	The ability of the proposed vented ford to pass vehicles during flood events would likely be less than that provided by the existing culverts.	Please provide rationale for this assertion.	As stated in RTC #19 FMIT-5, after further deliberation and consideration of all 90% comments received on this topic, PG&E will change the design of the northern BCW crossing to involve a) keeping the existing access road and b) burying the piping/ conduits within BCW and up-gradient of the existing access road. Similarly and concurrently, PG&E will also change the design of the southern BCW crossing to remove the aerial crossing and bury piping/conduit within BCW. Therefore, this comment is considered moot given this proposed design change.				
830	FMIT/TRC	Design	Request for Information	BOD Supp. 4.4 Evaluation of the TRC's Proposed Concept for BCW Crossing p.4-4	Supplemental Section 4 A ford would require burying the remedy infrastructure underground in the bottom of the wash, which would violate Agency direction and Tribal preference provided at the 30% phase of design. - PG&E was directed to eliminate trenches in Bat	Please indicate the amount of soil removal within Bat Cave Wash that will be required for the current constructed bridge alternative vs utilizing the crossing that presently exists (a vented ford) with the underground utilities buried in the upstream channel adjacent to the crossing, or replacing the existing structure with a ford, and again placing the utilities in the upstream channel	As stated in RTC #19 FMIT-5, after further deliberation and consideration of all 90% comments received on this topic, PG&E changed the design of the northern BCW crossing to involve a) keeping the existing access road and b) burying the piping/ conduits within BCW and up-gradient of the existing access road. Similarly and concurrently, PG&E also changed the design of the southern BCW crossing to remove the			Noted.	

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					Cave Wash after the 30% phase of design.		aerial crossing and bury piping/conduit within BCW. Therefore, this comment is considered moot given this proposed design change.				
831	Hualapai/TRC	Design	Request for Information	BOD Supp. 4.4 Evaluation of the TRC's Proposed Concept for BCW Crossing p.4-4	Supplemental Section 4 A ford would require burying the remedy infrastructure underground in the bottom of the wash, which would violate Agency direction and Tribal preference provided at the 30% phase of design. - PG&E was directed to eliminate trenches in Bat Cave Wash after the 30% phase of design.	Please indicate the amount of soil removal within Bat Cave Wash that will be required for the current constructed bridge alternative vs utilizing the crossing that presently exists (a vented ford) with the underground utilities buried in the upstream channel adjacent to the crossing, or replacing the existing structure with a ford, and again placing the utilities in the upstream channel	See above			Noted.	
832	Cocopah/TRC	Design	Request for Information	BOD Supp. 4.4 Evaluation of the TRC's Proposed Concept for BCW Crossing p.4-4	Supplemental Section 4 A ford would require burying the remedy infrastructure underground in the bottom of the wash, which would violate Agency direction and Tribal preference provided at the 30% phase of design. - PG&E was directed to eliminate trenches in Bat Cave Wash after the 30% phase of design.	Please indicate the amount of soil removal within Bat Cave Wash that will be required for the current constructed bridge alternative vs utilizing the crossing that presently exists (a vented ford) with the underground utilities buried in the upstream channel adjacent to the crossing, or replacing the existing structure with a ford, and again placing the utilities in the upstream channel	See above			Noted.	
833	Chemehuevi/ TRC	Design	Request for Information	BOD Supp. 4.4 Evaluation of the TRC's Proposed Concept for BCW Crossing	Supplemental Section 4 A ford would require burying the remedy infrastructure	Please indicate the amount of soil removal within Bat Cave Wash that will be required for the current constructed bridge alternative vs utilizing the crossing that presently exists (a vented ford) with the underground utilities buried in the upstream channel adjacent to the crossing, or replacing the existing structure with a ford, and again placing the utilities in the upstream channel	See above			Noted.	

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				p.4-4	underground in the bottom of the wash, which would violate Agency direction and Tribal preference provided at the 30% phase of design. - PG&E was directed to eliminate trenches in Bat Cave Wash after the 30% phase of design.						
834	DTSC-192	Non-design	Editorial	Section 5.1.1/ Page 38	The purpose of MW-BB and MW-CC is to provide arsenic monitoring data...from the IRL-2 injection well.... ALSO The purpose of MW-DD and MW-EE is to provide arsenic monitoring data...from the IRL-2 injection well....	Typo? MW-DD and MW-EE is for IRL-3.	Text will be changed to reference IRL-3.	Resolved.			Comment resolved.
835	DTSC-193	Design	CEQA/EIR	Section 5.1.1/ Page 38	Southwest Gas reserves final concurrence pending the review of final construction plans and their direct observations in the field during construction.	What will PG&E do if Southwest Gas does not concur?	PG&E will work to diligently to resolve comments, if any, from Southwest Gas at the time of their review. If a resolution cannot be reached, PG&E will discuss with the agencies or if during construction, PG&E will formally submit a work variance request.	Resolved.			Comment resolved.
836	DOI-339	Non-design	Editorial	Section 5.1.1/5-2	The purpose of MW-DD and MW-EE is to provide arsenic monitoring data 150 feet and 225 feet, respectively, from IRL-2 injection well.	The text should reference IRL-3, not IRL-2.	Text will be changed to reference IRL-3.		Resolved.		Comment resolved.
837	DOI-340	Design	Remedial design	5.1.2/5-3	It is assumed that the Southwest	Whether the gas pipeline is in the road or 2 feet outside of the road could affect Pipeline A design and construction. It is suggested that a simple utility locate be conducted as soon as practical to remove this uncertainty in the design.	The approximate location of the pipe, shown on DWG C-07-22,		Resolved.		Comment resolved.

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					pipeline is 2 feet outside of the road…		was determined during design with a simple utility locate and a site walk with the utility representatives. The location is considered assumed and approximate because the pipe was not exposed by potholing in this exact spot. The location of the pipe is considered known with enough certainty to allow construction of the designs shown in 90% and supplemental 90% submittals. To minimize ground disturbance prior to construction, potholing of this pipe will be sequenced at the beginning of construction to determine its precise location. The text will be revised as follows: "It is assumed, <u>based on existing utility locate information</u>, that the Southwest pipeline is 2 feet outside of the road…"				
838	DOI-341	Non-design	Editorial	5.1.2/5-3	This compromise would represent slightly more risk since IRL-1 must be constructed outside of the plume…	It should be clarified that this compromise represents installation of IRL-1 infrastructure partially in the north (not south) shoulder of the road. Second, the statement "slightly more risk" seems to be referencing the alternative location for IRL-1 completely in the road. This does not make sense because the two road locations are so close to each other. Is "slightly more risk" in reference to the original location for IRL-1? Please clarify.	The first two sentences in the last paragraph of Section 5.1.2 will be modified as follows: "An alternative to constructing the IRL-1 well and associated infrastructure completely within the road is to shift the IRL-1 infrastructure as far into the road as possible with the understanding that some will extend into the <u>north</u> shoulder of the road, similar to plans for the construction of IRL-3. This compromise would present slightly more risk since IRL-1 must be constructed outside of the plume and a shift to the south-southeast <u>from the originally planned location</u> is closer to the		Resolved.		Comment resolved.

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							plume (if the well is constructed within the plume, a replacement well might be required).”				
839	DTSC-194	Design	CEQA/EIR	Section 5.3 Page 40	The new air compressor building is for the Topock Compressor Station and is not part of the remedy project.	Moving of the air compressors are necessitated by the need to create space for new generators, which are part of the remedy. Therefore the moving of the air compressors into a new structure at a different location must be considered as part of the remedy even though the ultimate use of the air compressors would not be for the remedy.	For reasons unrelated to the remedy, the Compressor Station needs to upgrade its air compressors and decided to relocate them into a new building as part of the upgrade. The new air compressor building gives the Compressor Station better access to the upgraded compressors for maintenance and other purposes and makes operation easier than it is in the existing building. Accordingly, moving the air compressors is desired by the Compressor Station for its own independent purposes. Under CEQA case law, proposals (such as the moving of the air compressors) that have independent utility from the project being analyzed (here, the remedy) do not have to be included as part of the CEQA analysis for a project, although to the extent possible based on known and reasonably foreseeable information, would be considered in a cumulative analysis as was done in the 2011 EIR (see page 6-4).	Resolved.			Comment resolved.
840	DTSC-186	Design	Other	5.4 Potential Revegetation and Mitigation Planting Areas, Page 5-4		See comments below on Appendix V.	Noted.	Noted.			
841	DTSC-187	Design	Infrastructures	5.5 Construction, Staging, and Soil Storage Areas, Page 5-7		Summary and conclusion of Appendix W is needed in section 5.5 as the section currently just references the reader to the appendix.	A table will be added in Section 5.5 to summarize and present the conclusions of Appendix W.	Resolved.			Comment resolved.
842	DTSC-195	Design	CEQA/EIR	Section 5.6 Page 43	...to facilitate the maintenance of groundwater pipelines by allowing for	The meaning of this phrase appears to be defined further down the page as “continuous dosing of hydrochloric or other acids at low concentrations...” Is this maintenance technique already in use on the site? What impact would this have on geochemistry and effectiveness of remedy? Further discussion of the anticipated long term effects is needed.	Yes, this maintenance technique has been applied at IM3. Since 2010, acidification of the effluent from IM3 (to about pH 7) to control	Resolved.			Comment resolved.

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					addition of maintenance additives...		calcium carbonate scaling (in the mineral form of calcite) has continued to decrease the risk of well fouling and precipitation of solids in the injection well filter packs and formation. Injection well performance has been monitored and reported in Section 3 of the Performance Assessment Reports (these reports are available for download on the project website www.dtsc-topock.com). Based on this experience, PG&E plans to continue to acidify the effluent water at IM3 and proposes to apply same technique for the remedy.				
843	DTSC-188	Non-design	Editorial	BOD Appendix A10 Technical Memorandum: Assessment of Biological Resources for the Proposed Soil Management Areas	Attachment 1 Representative Site Photographs	Some photographs indicate dates of March 14, 2013 and November 19, 2013. The November 2013 date does not correlate with the dates in the text of the technical memorandum (see page 2) and casts doubt on which year is correct. Revise with correct year(s).	The dates on the first two photographs should be March 14, 2013 and November 19, 2014, respectively, so the second date needs to be corrected, The November 2014 date was incorrectly reported as November 10, 2014 in the first paragraph of the Flora and Fauna Subsection of the Methods Section and will also be corrected to read November 19, 2014.	Resolved.			Comment resolved.
844	DTSC-189	Design	Other	BOD Appendix A10 Technical Memorandum: Assessment of Biological Resources for the Proposed Soil Management Areas	Park Moabi Water Supply Well	DTSC does not believe the Park Moabi Water Supply Well located in between the soil processing area and bin storage yard is called out in the design. The well is adjacent to the bin yard access road. It seems that the well should be better protected from potential truck collision and be made more apparent and isolated via design. There is also potential public perception issues related to having contaminated soils storage adjacent to a water supply well.	The Park Moabi Water Supply Well is located along the soil storage yard access road. The well's existing protective features will be evaluated and any additional protective measures or measures taken to enhance visibility and warning of the well's location will be discussed and approved with San Bernardino County staff and BLM to the extent necessary, prior to construction.	Okay.			Comment resolved.
845	DTSC-190	Non-design	Editorial	Appendix	EIR Mitigation	Since MMRP refers to "Mitigation, Monitoring and Reporting Program." it's best to reference	Revision will be made as	Resolved.			Comment resolved.

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				A11/p 124	Measures CUL-1b/c-1 and 1-b/c-2 and CUL-2 are referred to as "MMRP CUL-1b/c-1 and 1-b/c-2" and "MMRP CUL-2."	individual measures as "Mitigation Measure ___."	suggested.				
846	DTSC-197	Non-design	CEQA/EIR	Appendix A11/p 125	HQSSS-A is an 8.1-acre rectangular tract of land....	The report states that HQSSS-B and HQSSS-C are owned and managed by BLM. Is the ownership/jurisdiction of HQSSS-A unclear?	HQSSS-A is owned by the federal government, managed by BLM and leased to San Bernardino County. Text will also be clarified in the BOD and C/RAWP.	Resolved.			Comment resolved.
847	DTSC-196	Non-design	CEQA/EIR	Appendix A11/p 126	HQSSS-C...The area does not show up as graded in aerial maps prior to 2010, indicating....the the disturbance to the area is recent.	The report states that HQSSS-C is owned and managed by BLM. Does BLM have land use records that provide a more definitive statement about this very large excavated area?	PG&E defers to BLM for response to this comment.		On January 20, 1934, a right-of-way for a material site was issued to BLM in Section 6, Lot 7 and 8 (which covers the HQSSS-C area) by an Act of Congress 11/9/1921.		
848	DTSC-191	Non-Design	CEQA/EIR: Cultural	Section 2.1.3/p 27 AND in Appendix A11 (page 126).	Access to the soil storage area will be via National Trails Highway.... ...tracking control BMPs... may be implemented by improving road entrance and exits, installation of temporary tracking pads... A previously unrecorded concrete post road marker . . . association with Route 66.	Please clarify the National Register status of the existing roadbed referenced in Section 2.1.3 / Page 27. Is it a remnant of National Old Trails Highway, Route 66, or both? If this road segment is part of a NRHP property, please describe (in the survey report) all elements of the property (within the expanded project area) that may contribute to its significance. Then, recommend measures to avoid or mitigate potential project impacts to those contributing elements, for the agencies' and SHPOs' review and to facilitate the CEQA analysis.	The existing roadway is a segment of the former 1947-1966 Route 66 alignment (not the original NOTH as implied by the current road name). In the past the California SHPO made several consensus determinations of National Register eligibility for the various remaining segments of Route 66 (CA-SBR-2910H) including those in the Project Area. To determine possible effects posed by the proposed remedy design, PG&E performed an integrity assessment of historic road segments in the Project Area pertaining to the NOTH and Route 66. This remaining segment (Segment X) of Route 66 was found to retain historical integrity. The assessment included the portion of the roadway in the expanded project area (see Map 3 of the				DTSC response: Comment resolved

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						Does PG&E recommend any protections other than the two measures described? (1) Incorporate Best Management Practices to prevent tracking sediment onto the public road [that appears to be National Old Trails Highway]. (2) Avoid the concrete road marker identified on the boundary of the expanded project area [that appears to be associated with an historic Route 66 alignment].	2012 *Integrity Evaluation of National Old Trails Highway/U.S. Highway 66* assessment report). A draft letter has been prepared by the BLM for transmittal to the SHPOs addressing potential project effects to all NOTH/Route 66 segments that retain historic integrity. **(Please note the description in Appendix A11 has been revised given more recent field surveys in the area; the updated information is included in *Addendum 12: Annual Report of Archaeological and Historical Resources Investigations During 2014*)** Based on the integrity assessment mentioned above, a draft *Treatment Plan* was submitted in conjunction with the proposed 90% Design to DTSC DOI and BLM for comment in September 2014. The BLM transmitted the Plan to the Tribes at that time as well for review. The Plan identifies the character-defining elements of this Segment X and proposed mitigation measures. Those measures are equally applicable to this portion of Segment X which was recently re-inspected with expansion of project area. PG&E is still anticipating comments on the draft Plan from the agencies. BLM has received comments on the draft Plan from certain Tribes.				
849	DTSC-198	Design	Infrastructures	BOD Appendix C: Calculations	Park Moabi Construction Headquarters Structural Calculations, Arcadis	The document does not appear final as hand written notes, typos, and mark-out corrections occur on many pages. Email messages (some partially highlighted) have also been directly copied into the document and it seems that they should be replaced with formal text as part of the design report.	Calculation documents may include hand-written calculations and notes if appropriate. Re-writing or other transposing of	Resolved.			Comment resolved.

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					02/02/2015		calculations may be completed by the professional engineer verifying the calculations in question.				
850	FMIT/TRC	Design	Infrastructures	BOD Supp.	Supplemental Sheet C-05-03	Fills on the north side of the road to IRL-2 should be re-evaluated and possibly eliminated and replaced with retaining walls and guard rails – to minimize disturbance of adjoining areas.	Installation of a retaining wall, guard rail, and sufficient foundation to support those structures will be a significant disruption to the adjoining areas.			Requires further discussion and explanation.	PG&E Response: As previously discussed in a similar RTC (60% RTC #442), PG&E does not recommend installation of a retaining wall because of the required amount of earthwork and associated disturbance, as well as the construction challenges in this general area. See also the associated visualization in Attachment J to the 60% RTC Table.
851	Hualapai/TRC	Design	Infrastructures	BOD Supp.	Supplemental Sheet C-05-03	Fills on the north side of the road to IRL-2 should be re-evaluated and possibly eliminated and replaced with retaining walls and guard rails – to minimize disturbance of adjoining areas.	See above				
852	Cocopah/TRC	Design	Infrastructures	BOD Supp.	Supplemental Sheet C-05-03	Fills on the north side of the road to IRL-2 should be re-evaluated and possibly eliminated and replaced with retaining walls and guard rails – to minimize disturbance of adjoining areas.	See above				
853	Chemehuevi/ TRC	Design	Infrastructures	BOD Supp.	Supplemental Sheet C-05-03	Fills on the north side of the road to IRL-2 should be re-evaluated and possibly eliminated and replaced with retaining walls and guard rails – to minimize disturbance of adjoining areas.	See above				
854	DTSC-199	Design	SOPs	O&M Plan Appendix B: Standard Operating Procedures Title: Conveyance System Inspection and Maintenance Number: PIPE-SOP-01_Rev0 Creation Date: 2/2/2015	4.6 Pig Receiver (Discharge) 1. Stage receiving tank(s) near the location where the pig receiver will be connected 5.5 Receiving tank staging 1. Stage receiving tank(s) near the retrieval point 6.4 Receiving tank staging 1. Stage secondary containment vinyl sheeting prior to tank setup 7.5 Receiving tank staging	Shouldn't portable secondary containment set up be called out while staging receiving tanks? For item 6.4 and 7.5, it is not clear if a secondary containment unit has been set up prior to the vinyl sheeting (see 6.3, #1). Is vinyl sheeting in addition to a plastic secondary containment unit/structure for 6.3 and 7.4 as well as 6.4?	Step 2.3 requires that plastic/vinyl sheeting be set up around the work area and under equipment (including receiving tanks) for all maintenance methods and this sheeting will serve as secondary containment. Sub-step #1 (under Steps 6.3 and 7.4) – "Verify that solution tank(s) has appropriate secondary containment" – is specific to the chemical solution tanks and was added to allow for mounting of these tanks on trucks with dedicated secondary containment as a preferred option.	Resolved.			Comment resolved.

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					1. Stage secondary containment vinyl sheeting prior to tank setup						
855	DTSC-200	Design	Other	C/RAWP Appendix V Technical Memorandum: Preliminary Assessment of Proposed Mitigation Planting Areas for Final Groundwater Remedy Impacts. Page 2.	"Further, it is intended that mitigation plantings would mimic the natural spacing and patterns of the surrounding vegetation, therefore, mitigation plantings are located within the sparsely vegetated areas between existing perennial vegetation."	The technical memorandum discusses revegetation and restoration and details how plantings would mimic natural spacing and patterns. However, Table 1 indicates one area (i.e., RHR-1) has not been previously disturbed. If so, why would one "revegetate" a pristine area, especially if revegetation has some level of impact/disturbance. Clarification and revision is requested.	In the case of RHR-1, there was no readily apparent ground surface evidence of previous disturbance. The intent of planting in this area would be to enrich the sparsely vegetation cover of native perennial shrubs beyond what is currently present. This site will be withdrawn from future consideration and still leave enough riparian mitigation area for projected plantings. We identified more riparian mitigation planting areas than needed in case a proposed site was disqualified during review. The terms 'revegetation' and 'restoration' as they apply to the proposed plantings are described in the 4th paragraph of the Introduction section of this appendix.	Assuming that planting would have some associated impacts, DTSC is not in favor of using area RHR-1.			Comment resolved.
856	DTSC-201	Non-design	Editorial	C/RAWP Appendix V Technical Memorandum: Preliminary Assessment of Proposed Mitigation Planting Areas for Final Groundwater Remedy Impacts. Page 3.	"Impacted mature plants on the historical floodplain (29 individual plants) were primarily composed of non-native tamarisk (Tamarix ramosissima) but also included two creosote bush (Larrea tridentata) plants."	Revise as indicated in the adjacent column to the left (see Table 2 for plant count)	Edit will be made as directed.	Resolved.			Comment resolved.
857	DTSC-202	Design	Other	C/RAWP Appendix V Technical Memorandum: Preliminary Assessment of	"The approximate extent of the hexavalent chromium groundwater	As Figure 1 also illustrates areas HFR-3, HFR-5 and, HFR-6 are within the chromium plume (blue line), additional text will be needed to explain that the groundwater contamination in the floodplain is currently located at depth with clean water above at the water table. However, after remedy start up, the chromium plume will be pushed through the IRZ and portions of the shallow zone in the floodplain could become contaminated. The section should also discuss this and the potential for plant uptake of IRZ byproducts, such as arsenic and manganese, expected along the	Text will be modified as directed to indicate that freshwater overlies the contaminated groundwater under current conditions. As	Arsenic and manganese are already present in the shallow floodplain and we anticipate that			Comment resolved.

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				Proposed Mitigation Planting Areas for Final Groundwater Remedy Impacts. Page 4.	plume (areas where the groundwater contains hexavalent chromium above background levels) is shown with a blue line in Figure 1. Based on that mapping, every proposed planting area, except UHR-3, is located well outside the known hexavalent chromium plume. For this reason, the potential for increased plant uptake of chromium from the groundwater would not be an issue at these locations."	entire floodplain after the remedy is implemented. Additional discussion and revision are requested.	the remedy is designed to reduce Cr(VI) along the NTH IRZ to prevent the migration of Cr(VI) into the floodplain, and there is a shallow naturally occurring reducing rind present in the shallow floodplain, it is unlikely that elevated Cr(VI) concentrations in the shallow floodplain groundwater will occur. Geochemical and solute transport modeling of the proposed remedial strategy indicate that the simulated arsenic and manganese byproducts already present in the shallow floodplain groundwater will remain within the range of the naturally occurring average observed manganese and arsenic concentrations in the shallow floodplain groundwater. Therefore it is anticipated the proposed remedy will not result in an increase in the average manganese or arsenic concentrations in the shallow floodplain groundwater. During remedy implementation manganese and arsenic concentrations will be monitored in the floodplain to confirm the magnitude and extent of byproduct concentrations. If byproduct concentrations increase beyond maximum observed concentrations, further evaluation of plant uptake of IRZ byproducts will be considered as part of the upcoming risk assessment activities.	more will be generated as byproducts of the remedy. It is likely that the average manganese and arsenic concentrations in the shallow floodplain groundwater will increase. DTSC is concerned with soluble constituents, such as arsenic, that may become bio-available for uptake by plants. DTSC wants to make sure that contaminants in the groundwater do not become available to receptors. If they are available to receptors via plant uptake, then the associated risk should be understood. This section should discuss the potential for plant uptake of IRZ byproducts, such as arsenic and manganese, expected along the entire floodplain after the remedy is implemented, and provide consideration for its impacts.			
858	DTSC-203	Design	Other	C/RAWP Appendix V Technical	"The sole proposed planting area	Other than being located near highly contaminated groundwater (e.g., well MW-20), location UHR-3 is located adjacent to the main IRZ line – the heart of the remedy. Therefore, the potential for the land to be used during the life of the remedy increases significantly as well as for incursions into the	This planting area was chosen because it was believed that the land	Resolved.			Comment resolved.

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				Memorandum: Preliminary Assessment of Proposed Mitigation Planting Areas for Final Groundwater Remedy Impacts. Page 4.	above the known groundwater plume, UHR-3, is located on a filled area adjacent to the BNSF railroad bridge."	area. UHR-3 is also adjacent to an active railroad and in its right of way. Earlier in the Introduction section (page 2) it was indicated that the planting areas were to be located away from infrastructure. Discussion is requested to see if UHR-3 area is appropriate or whether it should be dropped or replaced. Any changes would need to be reflected in the Conclusions section.	would not be needed for future remedy operations. A slightly larger amount of mitigation planting areas were identified in case a proposed site was disqualified during the 90% review. The proposed mitigation planting area UHR-3 will be dropped from further assessment of mitigation planting areas from the 90% Design.				
859	DTSC-204	Design	Other	C/RAWP Appendix W 3.3 Evaluation of Alternative Approaches to Staging Areas Pages 6-8.		PG&E has recently indicated that bin storage in Area 4 is no longer desired by them. Therefore, Area 4 space would now be available for alternative uses, and, at a minimum, could reduce use at other areas where the Tribes desire less impact. The Tribes (12/1/14) have noted a potential staging location around MW-25, yet PG&E has not responded to the potential to use that specific location. PG&E should provide a discussion based on Tribes recommendation as a response.	As discussed in RTC #803 DOI 333, in response to that comment, PG&E will eliminate the proposed soil storage area (Area 4) at Moabi Regional Park and move the proposed CHQ into Area 4. Therefore, Area 4 is no longer available for other use. The potential use of the area around MW-25 was brought up by Tribes in the March 2014 letters (see attachments to Appendix I of the 90% BOD). PG&E responded to the Tribes' question in an email dated March 11, 2014 as follows: "For Area #19, the Tribes also had the following question: There is a better place to the west (down the slope) where there already exists a large level place with a well (MW25). Why not go there instead? Proposed IRL-7 nearby. Also N (?). **Response:** The level place to the west of Area #19 serves as an access road used by BNSF, Southwest Gas Company, and PG&E gas transmission department. The access to their facilities cannot be impeded by PG&E's remediation work. Although a small portion	Resolved.			Comment resolved.

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							of this area may be periodically useful and available for PG&E remediation work, these other utility constraints and limited access using a steep driveway and tight turning radius led PG&E to conclude that this potential staging area has little value to the project." To date, PG&E has not received feedback from the Tribes on this response or an explanation as to why Tribes think this area is useful as a potential staging area.				
860	FMIT/TRC	Design	Infrastructures	Append W Table 1	C/RAWP Supplemental	Tribes have specifically expressed objections to the use of areas 6, 7, 12 and 13. Supplemental BOD information contains alternatives to these areas. The Tribes would like these alternatives to be utilized and assurance that areas 6,7,12, and 13 will be avoided. In addition, there should be a process to track and verify that the soil staging and construction work and temp storage areas AS IMPLEMENTED DURING CONSTRUCTION are actually consistent with Tribal input and the final lists extent of each area and its designated appropriate use of as ultimately determined.	Section 3.4 of the technical memorandum presents the following conclusion of the alternatives analysis: "All of the alternative approaches evaluated to avoid the use of the proposed Upland areas would have adverse effects on worker safety, public safety and nuisance, environmental impacts, and construction schedule duration that in PG&E's view would outweigh the benefits of eliminating those areas. Location of support zones for staging of construction-related equipment in close proximity to the actual construction activities is critical to PG&E's proposed approach for construction at the Topock site, and specifically in the Upland. This will allow for the safe and effective installation of all remedial facilities, as well as the subsequent decommissioning of IM-3, while protecting the surrounding sensitive resources, minimizing the overall construction footprint and use of			Comment noted. The Tribe continues to emphasize the unsuitability of these areas for use as work/storage areas during construction. If such use is allowed to occur, every effort should be made to limit the actual area used, and to minimize impacts on these areas and their surroundings. Comment is considered unresolved.	DTSC response: Tribal comment noted. Agencies will provide direction to PG&E regarding use of these areas.

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							undisturbed areas to the extent practicable, and minimizing the overall environmental impacts associated with the work activities." PG&E reiterates that the current proposed use of the Upland areas (Areas #6, 7, 12, and 13), which are in close proximity to the remedial infrastructure in the Upland, is required for efficient, successful and safe implementation of construction activities as they will result in the following benefits: • Providing the minimum number of practical locations to temporarily stage the required quantity of equipment and materials necessary to safely construct Pipelines A and H, the Upland monitoring and remediation wells, Bat Cave Wash crossing, and supporting infrastructure. • Increasing worker safety (e.g., reduces onsite construction traffic, vehicle congestion at primary work zones, and the overall mileage required to complete the work). • Increasing public safety and reducing nuisance to the public by decreasing the density of construction vehicle traffic on public roads (e.g., between Moabi Regional Park and				

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							the staging areas in the Upland), and reducing both the trip frequency and trip duration for construction vehicles (typically have relatively poor visibility) traveling between primary work zones and distant staging areas. • Reducing environmental impacts associated with execution of the work, including dust, noise, and GHG emissions. • Reducing the total construction schedule by allowing for the most efficient construction approach. In general, increasing the distance between an active primary work zone and its supporting staging area has several adverse impacts. Travel time increases significantly due to the greater distance between these locations, especially given the generally slow rate of travel of construction vehicles. To adequately supply a primary work zone from distant staging areas also requires use of either more frequent or larger, higher-capacity support vehicles to deliver required construction materials. Primary work zones then become more congested due to either the larger quantity of smaller vehicles or having larger vehicles unloading their materials at the already tightly-constrained primary work zones. The support vehicles will thus be more likely to				

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							become backed up at the primary work zone, impacting traffic at and near the work area and potentially traffic on nearby public roads (such as National Trails Highway). Congestion in primary work zones will also result in increased safety hazards associated with construction vehicles, which typically have relatively poor visibility, in close proximity to equipment and construction personnel. Increased traffic will increase dust, noise, and GHG emissions. Regarding the process for tracking and verification of the use of soil staging areas during remedy construction, PG&E refers the commenter to CIMP section 2.16 (Protocols for the inspection of remediation facilities and/or staging areas throughout the construction phase), CIMP section 2.12 (Protocols for Tribal Monitors to observe ground disturbing activities), and PA Appendix C – Monitoring Protocol/CHPMP §§ 6.6.4 (Protocols for Tribal Monitors to observe ground disturbing activities).				
861	Hualapai/TRC	Design	Infrastructures	Append W Table 1	C/RAWP Supplemental	Tribes have specifically expressed objections to the use of areas 6, 7, 12 and 13. Supplemental BOD information contains alternatives to these areas. The Tribes would like these alternatives to be utilized and assurance that areas 6,7,12, and 13 will be avoided. In addition, there should be a process to track and verify that the soil staging and construction work and temp storage areas AS IMPLEMENTED DURING CONSTRUCTION are actually consistent with Tribal input and the final lists extent of each area and its designated appropriate use of as ultimately determined.	See above			Comment noted. Hualapai continue to emphasize the unsuitability of these areas for use as work/ storage areas during construction. Comment is considered unresolved.	DTSC response: Tribal comment noted. Agencies will provide direction to PG&E regarding use of these areas.
862	Cocopah/TRC	Design	Infrastructures	Append W Table 1	C/RAWP Supplemental	Tribes have specifically expressed objections to the use of areas 6, 7, 12 and 13. Supplemental BOD information contains alternatives to these areas. The Tribes would like these alternatives to be utilized and assurance that areas 6,7,12, and 13 will be avoided. In addition, there should be a process to track and verify that the soil staging and construction work and temp storage areas AS IMPLEMENTED DURING CONSTRUCTION are actually consistent with Tribal input and the final lists extent of each area and its designated appropriate use of as ultimately determined.	See above			Comment noted. The Tribes continue to emphasize the unsuitability of these areas for use as work/ storage areas during construction. If such use is allowed to occur,	DTSC response: Tribal comment noted. Agencies will provide direction to PG&E regarding use of these areas.

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										every effort should be made to limit the actual area used, and to minimize impacts on these areas and their surroundings. Comment is considered unresolved.	
863	Chemehuevi/ TRC	Design	Infrastructures	Append W Table 1	C/RAWP Supplemental	Tribes have specifically expressed objections to the use of areas 6, 7, 12 and 13. Supplemental BOD information contains alternatives to these areas. The Tribes would like these alternatives to be utilized and assurance that areas 6,7,12, and 13 will be avoided. In addition, there should be a process to track and verify that the soil staging and construction work and temp storage areas AS IMPLEMENTED DURING CONSTRUCTION are actually consistent with Tribal input and the final lists extent of each area and its designated appropriate use of as ultimately determined.	See above			Comment noted. The Tribes continue to emphasize the unsuitability of these areas for use as work/ storage areas during construction. If such use is allowed to occur, every effort should be made to limit the actual area used, and to minimize impacts on these areas and their surroundings. Comment is considered unresolved.	DTSC response: Tribal comment noted. Agencies will provide direction to PG&E regarding use of these areas.
General Comments – Construction/Remedial Action Work Plan											
864	DOI-128	Non-design	Editorial	C/RAWP TOC/ Appendix B	SOPs	The TOC does not list titles of the SOPs contained in Appendix B. The titles should be included in the TOC or at the beginning of Appendix B.	Titles of the SOPs will be included at the beginning of Appendix B.		Accepted.		Comment resolved pending DOI review of the final design documents.
865	DOI-129	Non-design	Editorial	Main text. Acronyms and Abbreviations/ ix-xi		Please include the following: NRC – National Response Center, EMA – California (?) Emergency Management Agency [consider using CalEMA], SWPPP – Stormwater Pollution Prevention Plan, and CUPA – Certified Unified Program Agency	Additions will be made as requested. The reference in the C/RAWP is to California Emergency Management Agency. However, California EMA has changed its name to California OES, therefore, references to EMA will be replaced by OES in the Final Design.		Accepted.		Comment resolved pending DOI review of the final design documents.
Specific Comments – Construction/Remedial Action Work Plan, Section 1: Introduction											
866	DTSC-150	Non-design	Request for Information	Figure 1.2-2 and similar figures in design	+ notation for existing water supply wells	It is DTSC's understanding that the locations of PGE 1&2 are not where depicted. Since this is supposed to be a standalone document that would guide the remedy until completion, those well locations should be accurately plotted.	Applicable figures in the BOD, O&M Manual, and C/RAWP will be revised as requested. See also RTC #142 DTSC-26.	Resolved.			Comment resolved.
Specific Comments – Construction/Remedial Action Work Plan, Section 2: Project Organization and Management/Project Management Plan											
867	DOI-130	Non-design	Editorial	2.1/2-1	Exhibit 2.1-1 presents the project team organization chart for the construction and startup phase.	The Program Quality Assurance Manager and Health and Safety Manager are conspicuously absent from Exhibit 2.1-1. Please include these individuals in this Exhibit and in Table 2.1-1.	Exhibit 2.1-1 was updated to reflect current project team organization and to address this comment (see **Attachment S** of the final RTC table). Table 2.1-1 and Section 2 text will be updated in accordance with the exhibit.		Accepted.		Comment resolved pending DOI review of the final design documents.

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868	DOI-131	Non-design	Process	2.1/2-1	The project organization is intended to be a "living" element throughout the construction and startup, meaning that it can be updated as new information becomes available as the project proceeds or as site circumstances change.	Please clarify whether it is the organization, the personnel in the organization, or both that may change. Also, note how changes will be communicated to the stakeholders.	Both the organization and personnel may change as the project proceeds or as site circumstances change. Key changes to the organization or personnel will be included in the monthly progress reports during construction (see Section 2 of Exhibit 2.6-2, Monthly Progress Report Template). The monthly reports will be formally submitted to DTSC and DOI, and will be posted on a SharePoint site for access for Tribes and stakeholders.		Resolved.		Comment resolved.
869	DOI-132	Non-design	Editorial	2.2/2-1	These principles as described briefly…	"as" should be "are". Please revise.	Revision will be made as requested.		Resolved.		Comment resolved.
870	DOI-133	Non-design	Editorial	Exhibit 2.1-1/2-3	Dashed lines	Dashed lines appear to be lines of communication. Please define dashed and solid lines.	Correct, dashed lines are lines of communication. Solid lines are lines of authority, responsibility, and communication.		Resolved.		Comment resolved.
871	DOI-134	Non-design	Editorial	Table 2.1-1/2-19	Column titled "Project Role, Summary of Qualifications, and Lines of Communication"	Qualifications are not shown and this word should be eliminated from the column title and replaced with "Responsibilities". Lines of authority should be addressed and added to the column title.	Table 2.1-1 will be updated as requested.		Accepted.		Comment resolved pending DOI review of the final design documents.
872	DOI-135	Non-design	Process	2.3.3/2-5	General Comment	Provide some summary level discussion on how training will be documented and available for review by stakeholders.	The following text will be added at the end of the first paragraph under Section 2.3.3: "Attendees to each training will be required to sign a training roster. Copies of training rosters will be kept at the CHQ and available for review by stakeholders upon request."		Resolved.		Comment resolved.
873	DOI-136	Non-design	Editorial	2.3.3.1/2-5	The training occurs before field work and design submittal.	Please clarify meaning of training "before design submittal'.	This portion of the cited text is intended to note that key PG&E project staff and contractors that are involved in the design, have received cultural and historical resources sensitivity training, during the remedy design process		Resolved.		Comment resolved.

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							and before design submittal.				
874	DOI-137	Non-design	Editorial	2.4.2.1/2-8	Remedial infrastructure are planned on federal lands, including lands administered by U.S. Bureau of Reclamation (BOR) (managed by BLM) and HNWR (managed by USFWS)…	The implication in this paragraph is that there are federal agencies other than BLM, BOR and USFWS associated with the project. This is not the case. Additionally, the ponds and two storage areas are located on BLM lands.	Text will be revised to read as follows: "Remedial infrastructures are planned on federal lands, <u>for example lands managed by BLM,</u> ~~including~~ lands administered by U.S. Bureau of Reclamation (BOR) (managed by BLM), and <u>the</u> HNWR (managed by USFWS)…"		Resolved.		Comment resolved.
875	DOI-138	Non-design	Process	2.4.2.2 and 2.4.2.3/2-8 and 2-9	General Comment	Provide some discussion of the timing to acquire all the non-federal lands access approvals and to resolve RWQCB requirements for the evaporation ponds.	The following text will be added: "<u>PG&E is working towards obtaining all non-federal access agreements within 30 days of DTSC's approval of the Final Design and C/RAWP and within 90 days of DOI's request for such access agreements, consistent with the timing requirements in the Corrective Action Consent Agreement between PG&E and DTSC and the Remedial Design/Remedial Action Consent Decree between PG&E and the United States, on behalf of DOI.</u> <u>PG&E is coordinating with the RWQCB on the substantive requirements for use of the ponds for disposal of remedy-produced water streams. Goal is to obtain appropriate WDRs prior to agencies' approval of the Final Design and C/RAWP</u>."		DOI concurs with the response.		Comment resolved.
876	DOI-139	Non-design	Legal	2.4.2.3/2-9	In addition to the above, PG&E has and will continue to coordinate with the California Regional Water Quality Board (RWQCB)	PG&E shall provide updated language that documents agreements made with the RWCQB regarding the process to be followed in modifying the current permit for acceptance of the remedy waste stream. Additional, it shall be noted that the BLM ROW for the ponds will be made consistent with the agreements made with the RWCQB.	PG&E is coordinating with the RWQCB on the substantive requirements for use of the ponds for disposal of remedy-produced water streams. PG&E is currently developing a Report of Waste Discharge (ROWD) that		Accepted.		Comment resolved pending review of the final design documents.

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					regarding the substantive requirements applicable to the use of the evaporation ponds at the TCS for disposal of certain remedy-produced water streams.		is required by the RWQCB for purposes of amending the existing WDRs for the ponds to accept remedy-produced wastewater. The amended WDRs will include the requirements for discharging the remedy-produced wastewater into the existing ponds. PG&E understands further CEQA evaluation by DTSC would be required if there are new or substantially more severe impacts than those already disclosed in prior environmental review, but does not anticipate such impacts (see RTC #370). PG&E's regarding the BLM ROW is pending discussion with DOI. Updated language regarding the above process will be provided in the final design document and the C/RAWP.				
877	DOI-140	Non-design	Legal	2.4.3/2-9	PG&E welcomes DOI's input as to how DOI would like to receive this information (for example, as a standalone submittal, as an attachment to the progress reports, etc.).	It is DOI's preference to receive the ARAR compliance documentation as a standalone document. ARAR tables shall be updated to include actions taken to satisfy the ARAR and/or corrective measures taken if non-compliance occurs. Quarterly documentation shall continue through the first 5-year review period and then shall be submitted annually thereafter.	Text will be added to Item 1 of Section 2.4.3 to reflect DOI's stated preference.		Accepted.		Comment resolved pending DOI review of the final design documents.
878	DOI-141	Non-design	Legal	2.5/2-10	For purposes of this milestone, the duration of remedy construction will begin with DOI approval of the 100 percent design, and will end with PG&E's submittal of the Construction Completion	Revise the text to note that the duration period for the milestone shall continue through DOI's determination that the remedy is Operational and Functional.	Milestone #1 and Milestone #2 will be revised as suggested.		DOI concurs with the response.		Comment resolved pending DOI review of the final design documents.

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Groundwater Remedy Basis of Design Report/Final (100%) Design
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					Report.						
879	DOI-142	Non-design	Legal	2.5/2-10		Submittal of the Construction Completion Report shall be included as a compliance milestone.	The Construction Completion report will be added to Section 2.5, consistent with CD Section 71 b(4).		DOI concurs with the response.		Comment resolved pending DOI review of the final design documents.
880	FMIT/TRC	Non-design	CEQA/EIR	C/RAWP Sect.2.5 p. 2-10 Compliance Milestones	Annual monitoring reports for specified archaeological and historic properties pursuant to Section 6.6.5 of the CHPMP. Annual monitoring reports are proposed to be submitted to BLM by December 31 of each year for the duration of remedy construction. For purposes of this milestone, the duration of remedy construction will begin with DOI approval of the 100 percent design, and will end with PG&E's submittal of the Construction Completion Report.	It is not clear why monitoring would not occur over the entire remedy duration as it is possible that impacts will occur during routine maintenance of the system. Please explain how monitoring and maintenance activities will be conducted in a way to ensure that impacts to archeological resources do not occur after remedy start up. In addition please explain how integrity of cultural resources will be ensured post remedy start up.	EIR mitigation measure CUL-1a-3 requires annual monitoring throughout the duration of the Project. CHPMP Sections 6.6.4, 6.6.5, and 6.8 call for construction monitoring and periodic monitoring during and after the construction period. Integrity of resources will be ensured through continued Tribal Consultation as required by the Programmatic Agreement, including the PA's Appendix B Consultation Protocol and CHPMP (Section 6), CUL-1a-8(a), protocol for continued Tribal communication, CUL-1a-8(j), protocol for advanced notification of project-related activities, and CUL-1a-8(l), provisions affording sufficient tribal monitors to observe ground-disturbing activities and/or other scientific surveying (e.g., biological surveys) that may occur in preparation for construction activities.			Through discussions with Tribal representatives, terrestrial (ground-based) and low-altitude aerial LIDAR surveys should be considered/ reconsidered for documenting both existing conditions, and changed conditions resulting from remedy construction, operation, maintenance and decommissioning.	DTSC response: Tribal comment noted. PG&E Response: As requested by stakeholders and as noted by PG&E at the August 18-19 TWG meeting, PG&E will continue to evaluate low-altitude aerial LIDAR surveys for potential application to the groundwater remedy.
881	Hualapai/TRC	Non-design	CEQA/EIR	C/RAWP Sect.2.5 p. 2-10 Compliance Milestones	Annual monitoring reports for specified archaeological and historic properties pursuant to Section 6.6.5 of the CHPMP. Annual monitoring reports are proposed to be submitted to BLM by December 31 of each year for the duration of	It is not clear why monitoring would not occur over the entire remedy duration as it is possible that impacts will occur during routine maintenance of the system. Please explain how monitoring and maintenance activities will be conducted in a way to ensure that impacts to archeological resources do not occur after remedy start up. In addition please explain how integrity of cultural resources will be ensured post remedy start up.	See above			Through discussions with Tribal representatives, terrestrial (ground-based) and low-altitude aerial LIDAR surveys should be considered / reconsidered for documenting both existing conditions, and changed conditions resulting from remedy construction, operation, maintenance and decommissioning.	See response 880

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					remedy construction. For purposes of this milestone, the duration of remedy construction will begin with DOI approval of the 100 percent design, and will end with PG&E's submittal of the Construction Completion Report.						
882	Cocopah/TRC	Non-design	CEQA/EIR	C/RAWP Sect.2.5 p. 2-10 Compliance Milestones	Annual monitoring reports for specified archaeological and historic properties pursuant to Section 6.6.5 of the CHPMP. Annual monitoring reports are proposed to be submitted to BLM by December 31 of each year for the duration of remedy construction. For purposes of this milestone, the duration of remedy construction will begin with DOI approval of the 100 percent design, and will end with PG&E's submittal of the Construction Completion Report.	It is not clear why monitoring would not occur over the entire remedy duration as it is possible that impacts will occur during routine maintenance of the system. Please explain how monitoring and maintenance activities will be conducted in a way to ensure that impacts to archeological resources do not occur after remedy start up. In addition please explain how integrity of cultural resources will be ensured post remedy start up.	See above			Through discussions with Tribal representatives, terrestrial (ground-based) and low-altitude aerial LIDAR surveys should be considered / reconsidered for documenting both existing conditions, and changed conditions resulting from remedy construction, operation, maintenance and decommissioning.	See response 880
883	Chemehuevi/ TRC	Non-design	CEQA/EIR	C/RAWP Sect.2.5 p. 2-10 Compliance Milestones	Annual monitoring reports for specified archaeological and historic properties	It is not clear why monitoring would not occur over the entire remedy duration as it is possible that impacts will occur during routine maintenance of the system. Please explain how monitoring and maintenance activities will be conducted in a way to ensure that impacts to archeological resources do not occur after remedy start up. In addition please explain how integrity of cultural resources will be ensured post remedy start up.	See above			Through discussions with Tribal representatives, terrestrial (ground-based) and low-altitude aerial LIDAR surveys should be considered /	See response 880

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					pursuant to Section 6.6.5 of the CHPMP. Annual monitoring reports are proposed to be submitted to BLM by December 31 of each year for the duration of remedy construction. For purposes of this milestone, the duration of remedy construction will begin with DOI approval of the 100 percent design, and will end with PG&E's submittal of the Construction Completion Report.					reconsidered for documenting both existing conditions, and changed conditions resulting from remedy construction, operation, maintenance and decommissioning.	
884	FMIT/TRC	Design	Process	C/RAWP, Sect. 2.6, p. 2-10	The data will be maintained in a database and will be reviewed by experienced field staff or chemist. Historic trends, water quality data, and well construction details will also be made available.	In order to ensure transparency throughout the remedy installation and operation, the Tribes request that field data and subsequent data analyses be audited by tribal representatives as the data are generated. For example, Tribes would like to be provided with all data that might result in installation of more wells, and data related to progress and success of the groundwater remedy. This process will ensure project transparency and allow the Tribes continued participation in the protection of the Cultural Spiritual Landscape.	PG&E will describe the data collected (generated or received) in the monthly progress reports to be prepared during construction (see C/RAWP Exhibit 2.6-2 (Monthly Progress Report Template) under "Description of Activities and Work Completed"). A summary of the lithologic and water quality data collected during well installation will be provided in the monthly progress reports (see C/RAWP Section 3.2.1.3, Approach to Finalizing Well Design and/or Siting). PG&E will submit the reports to DTSC and DOI, and will also post them on a SharePoint site (see C/RAWP Section 2.6.2.4). Information posted on the SharePoint site can be viewed or downloaded by Tribes and stakeholders for		DOI concurs with the response.	It is understood that agencies, especially federal, have a trust responsibility to the Tribes to implement a rigorous quality assurance review program in order the assure that the data are collected and analyzed with the utmost of care and professionalism. Comment resolved pending development of plans for outside quality assurance reviews of information and data related to laboratory analyses, water levels, surveys, operations, maintenance, safety, and mitigation.	DTSC and DOI response: The Agencies agree that careful review and evaluation of data is necessary throughout the life of the project. That is part of our role as the lead agencies to provide oversight of this project. The Agencies will ensure that PG&E follows the QA/QC programs currently in place for construction, remedy operation and groundwater monitoring. Regulatory oversight will continue throughout remedy implementation. No independent (outside) plans are necessary .However, DTSC does not agree that there is a need to develop plans for outside quality assurance review.

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							review. This practice will allow data to be provided prior to installation of more wells (i.e., more than currently planned wells).				
885	Hualapai/TRC	Design	Process	C/RAWP, Sect. 2.6, p. 2-10	The data will be maintained in a database and will be reviewed by experienced field staff or chemist. Historic trends, water quality data, and well construction details will also be made available.	In order to ensure transparency throughout the remedy installation and operation, the Tribes request that field data and subsequent data analyses be audited by tribal representatives as the data are generated. For example, Tribes would like to be provided with all data that might result in installation of more wells, and data related to progress and success of the groundwater remedy. This process will ensure project transparency and allow the Tribes continued participation in the protection of the Cultural Spiritual Landscape.	See above		See above	It is understood that agencies have a trust responsibility to Hualapai and interested tribes, to implement a rigorous quality assurance review program in order the assure that the data are collected and analyzed with the utmost of care and professionalism. Comment resolved pending development of plans for outside quality assurance reviews of information and data related to laboratory analyses, water levels, surveys, operations, maintenance, safety, and mitigation.	DTSC Response: See comment to RTC #884
886	Cocopah/TRC	Design	Process	C/RAWP, Sect. 2.6, p. 2-10	The data will be maintained in a database and will be reviewed by experienced field staff or chemist. Historic trends, water quality data, and well construction details will also be made available.	In order to ensure transparency throughout the remedy installation and operation, the Tribes request that field data and subsequent data analyses be audited by tribal representatives as the data are generated. For example, Tribes would like to be provided with all data that might result in installation of more wells, and data related to progress and success of the groundwater remedy. This process will ensure project transparency and allow the Tribes continued participation in the protection of the Cultural Spiritual Landscape.	See above		See above	It is understood that agencies have a trust responsibility to the Tribes to implement a rigorous quality assurance review program in order the assure that the data are collected and analyzed with the utmost of care and professionalism. Comment resolved pending development of plans for outside quality assurance reviews of information and data related to laboratory analyses, water levels, surveys, operations, maintenance, safety, and mitigation.	DTSC Response: See comment to RTC #884
887	Chemehuevi/ TRC	Design	Process	C/RAWP, Sect. 2.6, p. 2-10	The data will be maintained in a database and will be reviewed by experienced field staff or chemist. Historic trends, water quality	In order to ensure transparency throughout the remedy installation and operation, the Tribes request that field data and subsequent data analyses be audited by tribal representatives as the data are generated. For example, Tribes would like to be provided with all data that might result in installation of more wells, and data related to progress and success of the groundwater remedy. This process will ensure project transparency and allow the Tribes continued participation in the protection of the Cultural Spiritual Landscape.	See above		See above	It is understood that agencies have a trust responsibility to the Tribes to implement a rigorous quality assurance review program in order the assure that the data are collected and analyzed with the utmost of care	DTSC Response: See comment to RTC #884

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					data, and well construction details will also be made available.					and professionalism. Comment resolved pending development of plans for outside quality assurance reviews of information and data related to laboratory analyses, water levels, surveys, operations, maintenance, safety, and mitigation.	
888	DTSC-151	Non-design	Process	2.6.1.2 Onsite Laboratory Data, Page 2-12	"Onsite laboratory samples will periodically be analyzed in conjunction with offsite analysis, and the data will be reviewed/ compared for quality and accuracy."	The frequency of comparative analysis should be stated. More frequent comparisons should be made early on during the program and relaxed after adequate assessment. The comparative analysis should be documented and periodically reported to agencies. Revision requested.	The text will be updated as follows: "Onsite laboratory samples will ~~periodically~~ be analyzed in conjunction with offsite analysis <u>at a rate of 10% for Cr(VI), Cr(T), ferrous iron, conductivity, turbidity, pH, nitrate, sulfate, alkalinity, total organic carbon, orthophosphate, manganese, and total dissolved solids.</u> Data will be reviewed/compared for quality and accuracy <u>and reported to the agencies</u>. <u>The frequency of comparative analysis will be evaluated after assessment of data.</u>"	Resolved.			Comment resolved.
889	FMIT/TRC 60% BOD RTC-730, -731	Design	Process	C/RAWP, Sect. 2.6.1.2, p. 2-12	Onsite Laboratory Data	Dissolved sulfide analyses are again not mentioned. In the 60% BOD response to comments RTC-730 and 731, PG&E's Response regarding dissolved sulfide, as follows: "Hydrogen sulfide will be periodically monitored in the on-site lab as a means to monitor subsurface conditions and understand how the process of reducing the Cr(VI) is progressing."	Because hydrogen sulfide is not currently monitored as part of groundwater monitoring at Topock, comparison samples will need to be collected and analyzed in an offsite laboratory and the onsite laboratory. Once the comparison data verifies the onsite laboratory's ability to achieve usable results, onsite analysis can be performed as needed to further the understanding of the subsurface conditions and the progress of Cr(VI) reduction. The following sentence will be added to the first paragraph of Section 2.6.1.2: "<u>Samples will also be</u>			Hexavalent chromium contamination at Topock is a chemistry problem with a chemistry solution. Also the Tribe suggests analyses for hydrogen gas. These data are critical for the safe and successful implementation of the groundwater remedy. Comment unresolved pending development of a plan to analyze hydrogen gas concentrations in water and soil within the IRZ.	PGE Response: As stated in RTC #730 (Hualapai-140 Chemehuevi-140, Cocopah-140, CRIT-140) from the 60% design, generation of hydrogen gas is not anticipated to be an issue and is therefore not planned for monitoring. For reference, here is the response that was provided to resolve that comment in the 60% design, "When in situ treatment was first being introduced as a treatment for groundwater contamination, the fear of excess

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							analyzed for hydrogen sulfide at an offsite laboratory and the onsite laboratory to establish the onsite laboratory's ability to achieve useable results, so that onsite analysis can be performed as needed."				hydrogen gas being produced at explosive levels was common. However, over time it has been shown that although hydrogen gas is produced it is not typically produced at explosive levels. Extra care needs to be taken in cases where hydrogen gas and hydrogen sulfide can displace air such as confined space (e.g. well vaults)."
890	Hualapai/TRC 60% BOD RTC-730, -731	Design	Process	C/RAWP, Sect. 2.6.1.2, p. 2-12	Onsite Laboratory Data	Dissolved sulfide analyses are again not mentioned. In the 60% BOD response to comments RTC-730 and 731, PG&E's Response regarding dissolved sulfide, as follows: "Hydrogen sulfide will be periodically monitored in the on-site lab as a means to monitor subsurface conditions and understand how the process of reducing the Cr(VI) is progressing."	See above			Hexavalent chromium contamination at Topock is a chemistry problem with a chemistry solution. Also suggest analyses for hydrogen gas. These data are critical for the safe and successful implementation of the groundwater remedy. Comment unresolved pending development of a plan to analyze hydrogen gas concentrations in water and soil within the IRZ.	See response 889
891	Cocopah/TRC 60% BOD RTC-730, -731	Design	Process	C/RAWP, Sect. 2.6.1.2, p. 2-12	Onsite Laboratory Data	Dissolved sulfide analyses are again not mentioned. In the 60% BOD response to comments RTC-730 and 731, PG&E's Response regarding dissolved sulfide, as follows: "Hydrogen sulfide will be periodically monitored in the on-site lab as a means to monitor subsurface conditions and understand how the process of reducing the Cr(VI) is progressing."	See above			Hexavalent chromium contamination at Topock is a chemistry problem with a chemistry solution. Also suggest analyses for hydrogen gas. These data are critical for the safe and successful implementation of the groundwater remedy. Comment unresolved pending development of a plan to analyze hydrogen gas concentrations in water and soil within the IRZ.	See response 889
892	Chemehuevi/ TRC 60% BOD RTC-730, -731	Design	Process	C/RAWP, Sect. 2.6.1.2, p. 2-12	Onsite Laboratory Data	Dissolved sulfide analyses are again not mentioned. In the 60% BOD response to comments RTC-730 and 731, PG&E's Response regarding dissolved sulfide, as follows: "Hydrogen sulfide will be periodically monitored in the on-site lab as a means to monitor subsurface conditions and understand how the process of reducing the Cr(VI) is progressing."	See above			Hexavalent chromium contamination at Topock is a chemistry problem with a chemistry solution. Also suggest analyses for hydrogen gas. These data are critical for the safe and	See response 889

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										successful implementation of the groundwater remedy. Comment unresolved pending development of a plan to analyze hydrogen gas concentrations in water and soil within the IRZ.	
893	DTSC-152	Non-design	Process	2.6.1.3 Offsite Laboratory Data, Page 2-12	"Hardcopy and electronic versions of analytical data will be archived in project files, on electronic archive tapes, and/or on other electronic storage media for the duration of remedy operation as specified in Section 2.6.2 of this C/RAWP. Electronic laboratory data will be subject to routine backup until it is archived for long-term retention."	Data Reporting: For clarity, the BOD and/or CRAWP should indicate what laboratory analytical data will be submitted with agency reports.	In general, a Level 1 laboratory analytical data package will be submitted with reports to the agencies. This is similar to the data packages that are included in the current monitoring reports. Full data packages will be available upon request.	Resolved.			Comment resolved.
894	DTSC-153	Non-design	Request for Information	Section 2.6.2.2, Records of Soil, Water, and Waste Materials…	Last sentence of first paragraph. "Soil accumulation areas will be inspected routinely, and inspection report will also be retained."	Please specify timing for "routinely." If cited elsewhere in document (O&M manual or SOP), please reference location.	The following citation will be added: "Soil accumulation areas will be inspected routinely, and inspection report will also be retained <u>(see Sections 2.1, 2.2, and 2.4 of Appendix C of the Soil Management Plan [included as Appendix L of the CRAWP])</u>."				
895	DOI-143	Non-design	Process	2.6.2.3/2-14	Records from above activities may be hardcopy or may be incorporated in an electronic database system. Hardcopy field records and/or inspection forms will be	Please note where agency representatives may access records for review.	The CHQ will serve as the primary repository for records during construction. Records kept in hard copies or electronic can be made available for review upon request. This information will be added to the text.		Accepted.		Comment resolved pending DOI review of the final design documents.

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					scanned for electronic storage.						
896	DOI-144	Non-design	Process	Exhibit 2.6-2/2-15		Section 2. This section should identify which deviations from the design have been approved by the agencies, those that are pending, and potential schedule impacts from the review/approval process. Section 4. It is recommended that the planned community activities be moved to Section 3.	**Section 2**: The following text will be added (<u>underline</u>; for addition): "…, and <u>work variance requests (i.e., material</u> deviations from…..), <u>agencies' actions on those requests, and potential schedule impacts.</u>" **Section 4**: Text related to planned community activities will be moved to Section 3 as requested.		Resolved.		Comment resolved.
897	FMIT/TRC 1m	Non-design	Request for Information	2.6.3.2 Construction Completion Report	The Construction Completion Report will be prepared by a registered professional engineer, will be submitted to DTSC and DOI, and will include: Explanation and description of modifications to the final design plans and specifications and why the modifications were necessary	Please clearly indicate what level of involvement the Tribes will have in modification decisions made to the design post submission of the 100% BOD reports.	Please see RTCs #44 FMIT/TRC, #45 Hualapai/ TRC, #46 Cocopah/TRC, and #47 Chemehuevi/ TRC. Note also that PG&E will submit the Construction Completion Report to DTSC and DOI, and will also post it on a SharePoint site for access by Tribes and stakeholders (see C/RAWP Section 2.6.2.4).		DOI concurs with the response.	Please see response to comment FMIT/TRC RTC #44.	DTSC response: Tribal comment noted.
898	Hualapai/TRC 1m	Non-design	Request for Information	2.6.3.2 Construction Completion Report	The Construction Completion Report will be prepared by a registered professional engineer, will be submitted to DTSC and DOI, and will include: Explanation and description of modifications to the final design plans and specifications and why the modifications were necessary	Please clearly indicate what level of involvement the Tribes will have in modification decisions made to the design post submission of the 100% BOD reports.	See above		See above	See response to comment Hualapai/ TRC RTC #83	DTSC response: Tribal comment noted.

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899	Cocopah/TRC 1m	Non-design	Request for Information	2.6.3.2 Construction Completion Report	The Construction Completion Report will be prepared by a registered professional engineer, will be submitted to DTSC and DOI, and will include: Explanation and description of modifications to the final design plans and specifications and why the modifications were necessary	Please clearly indicate what level of involvement the Tribes will have in modification decisions made to the design post submission of the 100% BOD reports.	See above		See above	See response to Cocopah RTC #84.	DTSC response: Tribal comment noted.
900	Chemehuevi/ TRC 1m	Non-design	Request for Information	2.6.3.2 Construction Completion Report	The Construction Completion Report will be prepared by a registered professional engineer, will be submitted to DTSC and DOI, and will include: Explanation and description of modifications to the final design plans and specifications and why the modifications were necessary	Please clearly indicate what level of involvement the Tribes will have in modification decisions made to the design post submission of the 100% BOD reports.	See above		See above	See Chemehuevi/TRC RTC #85	DTSC response: Tribal comment noted.
901	DTSC-154	Non-design	Process	2.6.3.3 Additional Reporting During Remedy Construction, Page 2-16		The section must clarify that groundwater and surface water monitoring data will be collected and reported to agencies periodically during the construction period. Please specify the reporting period as well.	The following bullet will be added (<u>underline</u>; for addition): "<u>Quarterly groundwater and surface water monitoring reports</u>."	Resolved.			Comment resolved.
902	DTSC-155	Non-design	Process	Table 2.3-1, Page 2-21	"Notify DOI 28 days in advance of sample collection activities, unless shorter notice is agreed to by DOI (CD 24)."	Please revise to notify "regulatory agencies" as opposed to just "DOI"	The cited text is in reference to a specific requirement in the CD. The following text will be added in response to this comment: "Notify DOI 28 days in advance of sample collection activities, unless shorter notice is agreed to by DOI (CD 24). <u>Notify DTSC at least</u>	Resolved.			Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							<u>7 days in advance of sample collection activities (CACA X[3])</u>". Also add CACA X(3) in the "Required By" column. These changes will be transferred to Exhibit L2.2-1 of the O&M Manual for consistency.				
903	DTSC-156	Non-design	Other	Table 2.3-1, Page 2-21/Figure 2.3-1.	"Figure 2.3-1 presents a template for the Monthly Progress Reports."	Figure 2.3-1 is a Work Variance Request Form and needs to be replaced with the appropriate template.	The cited text will be revised to read (revisions are shown in strikeout [~~strikeout~~; for deletion] and underline [<u>underline</u>; for addition]): "~~Figure 2.3-1~~ <u>Exhibit 2.6-2</u> presents a template for the Monthly Progress Reports."	Resolved.			Comment resolved.
904	DTSC-157	Non-design	Process	Table 2.3-1, Page 2-22.	"Submit a Work Variance Request Form (exhibit 2.3-3 to agencies for approval 5 calendar days before the anticipated work occurs or unless agreed to otherwise with agencies."	Exhibit 2.3-3 appears to be Figure 2.3-1. Revision needed. The note must also clarify that 5 day approvals will not be possible for complicated requests.	Text will be revised to read: "(~~exhibit 2.3-3~~ <u>Figure 2.3-1</u>) to agencies for approval 5 working days before the anticipated work occurs ~~or unless agreed to otherwise with agencies~~. <u>Agencies will act on the request or notify PG&E that more time is required.</u>	Resolved.			Comment resolved.
905	DOI-145	Non-design	Process	Table 2.3-1		Page 2-20. Add BLM to the "Party Communication is Addressed to" column. Page 2-23. Add DTSC to the "Discovery of changes…" party communication column. Pages 23 & 24. Order of communication should be DOI PM, DOI alt-PM, then responsible bureau for emergency and release events. Notifications under the PBA shall remain intact. Page 2-25. Included notification to DOI in the 3rd row (USDOT-regulated haz mat) Page 2-26. Included notification to DOI in the first row (human-caused disturbance) Page 2-26. Delete "interested" prior to all references to the Tribes. (Discovery of human remains or burials) Page 2-27. Included notification to DOI in the first row (previously unidentified resources) Please ensure that the changes identified above are transferred to Exhibit L2.2-1 of the O&M plan for consistency.	Page 2-20. BLM will be added as requested. Page 2-23. Addition will be made as requested. Also add CACA under the "Required By" column. Pages 23 and 24. The order of communication will be revised to reflect this comment. Page 2-25. Addition will be made as requested. Also add CD 52 under the "Required By" column. Page 2-26. Addition will be made as requested. Notification to DOI will also be added to the Site Security Plan. Page 2-26. Deletion will be made as requested. Page 2-27. Notification to DOI will be added to the 2nd sentence, under "BLM will then notify…"	Page 2-25. Also include notification to DTSC.	Resolved.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							These changes will be transferred to Exhibit L2.2-1 of the O&M Manual as requested.				
906	DOI-146	Non-design	Editorial	Table 2.3-1/2-22	Submit a Work Variance Request Form (exhibit 2.3-3 to agencies for approval	The reference should be Figure 2.3-1. Please revise.	See RTC #904 DTSC-157.		Resolved.		Comment resolved.
907	JDS-1	Non-design	Editorial	Table 2.3- 1; p. 2-22	Material Deviation from Workplans....	Add tribes to party communication is addressed to for changes on FMIT property	The following text will be added in response to this comment: Under the "Party Communication is Addressed To" column: "<u>FMIT (for material deviation on FMIT property)</u>" Under the "General Communication Procedures/Protocols" column: "<u>Notify FMIT that a Work Variance Request has been submitted to the agencies for a material deviation on FMIT property.</u>"			Comment resolved.	Comment resolved.
908	FMIT/TRC	Non-design	Request for Information	C/RAWP TABLE 2.3-1 Communication Framework during Construction and Startup		Within the "numerous triggering events (e.g. Progress reporting Material Deviations from Work Plan and design documents, MMRP, action-specific and location-specific ARARs" category it indicates that the only parties addressed in communications are the DTSC and DOI. The Tribes would like to know specifically why they are not on this list and would like the revised report to include Tribes under Party Communication Addressed to.	As explained in RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/TRC, Table 2.3-1 of the C/RAWP summarizes PG&E's obligation for formal communication to certain parties during the construction and startup phase. The required formal communication stems from various directives and agreements with, State and Federal Agencies, state and federal laws, MOUs with certain Tribes, the 2006 Settlement Agreement with the FMIT, and other required project documents. The table clearly spells out the parties (including Tribes in certain instances) to receive the formal communication from PG&E and the general			The Tribe reiterates the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape. PG&E should remain mindful of its independent legal obligations under the 2006 Settlement Agreement to consult with FMIT and to	DTSC response: Tribal comment noted.

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							communication procedures and protocols in accordance with the requirements. In addition, as described in RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/TRC, certain of the communications in Table 2.3-1 will be posted on a SharePoint site for access by Tribes and stakeholders.			provide all non-attorney-client privileged material information, documentary or otherwise, to the Tribe contemporaneously with its receipt or development by PG&E.	
909	Hualapai/TRC	Non-design	Request for Information	C/RAWP TABLE 2.3-1 Communication Framework during Construction and Startup		Within the "numerous triggering events (e.g. Progress reporting Material Deviations from Work Plan and design documents, MMRP, action-specific and location-specific ARARs" category it indicates that the only parties addressed in communications are the DTSC and DOI. The Tribes would like to know specifically why they are not on this list and would like the revised report to include Tribes under Party Communication Addressed to.	See above			Hualapai reiterates the need to be included (along with DOI and DTSC) as a primary party in communications regarding all project design changes, or work variance requests including material deviations from the design documents and/or C/RAWP due to discovery of changed site conditions as discussed in these earlier comments (at left). Communicating these changes needs to occur as soon as it is known that a change needs to be made. Hualapai needs to be included in those discussions via informing a tribal monitor, or email or telephone calls to designated points of contact. Once the change has been approved then a formal document can be forwarded to Hualapai.	DTSC response: Tribal comment noted.
910	Cocopah/TRC	Non-design	Request for Information	C/RAWP TABLE 2.3-1 Communication Framework during Construction and Startup		Within the "numerous triggering events (e.g. Progress reporting Material Deviations from Work Plan and design documents, MMRP, action-specific and location-specific ARARs" category it indicates that the only parties addressed in communications are the DTSC and DOI. The Tribes would like to know specifically why they are not on this list and would like the revised report to include Tribes under Party Communication Addressed to.	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs	DTSC response: Tribal comment noted.

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										occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	
911	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP TABLE 2.3-1 Communication Framework during Construction and Startup		Within the "numerous triggering events (e.g. Progress reporting Material Deviations from Work Plan and design documents, MMRP, action-specific and location-specific ARARs" category it indicates that the only parties addressed in communications are the DTSC and DOI. The Tribes would like to know specifically why they are not on this list and would like the revised report to include Tribes under Party Communication Addressed to.	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	DTSC response: Tribal comment noted.
912	DOI-147	Non-design	Process	Figure 2.3-1/2-29	General Comment	Consider adding approval signature lines for the PG&E Project Manager, the PG&E QA Manager, and the approving agency.	In response to this comment, Figure 2.3-1 was updated to include the approval signature lines for the approving agency, the PG&E Construction Manager or designee (who will sign in consultation with the Construction Steering Committee), and the PG&E QA Manager. It is recognized that approval via email can be made in lieu of signature.		Resolved.		Comment resolved.
913	FMIT/TRC 60% BOD RTC-526	Non-design	Request for Information	C/RAWP FIGURE 2.3-1 Work Variance Request Form		Please indicate what level of notification the Tribes will receive when a work variance request form is submitted. At what point in the variance review process will Tribes be notified? This is a follow-on from 60% RTC #526.	As stated in RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/TRC, PG&E will formally submit work variance request(s) to DTSC and DOI. In response to comment #907 JDS-1, PG&E will also notify the FMIT			he Tribe reiterates the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs	DTSC response: Tribal comment noted.

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							when a work variance request for material deviation on the FMIT property, is submitted to the agencies. Further, PG&E will include a description of work variance requests and/or agencies' actions in the monthly progress reports (see C/RAWP Exhibit 2.6-2 [Monthly Progress Report Template] under "Description of Activities and Work Completed"). The monthly progress reports will be submitted to DTSC and DOI, and also posted on a SharePoint site for access by Tribes and stakeholders (see C/RAWP Section 2.6.2.4).			occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape. PG&E should remain mindful of its independent legal obligations under the 2006 Settlement Agreement to consult with FMIT and to provide all non-attorney-client privileged material information, documentary or otherwise, to the Tribe contemporaneously with its receipt or development by PG&E.	
914	Hualapai/TRC 60% BOD RTC-526	Non-design	Request for Information	C/RAWP FIGURE 2.3-1 Work Variance Request Form		Please indicate what level of notification the Tribes will receive when a work variance request form is submitted. At what point in the variance review process will Tribes be notified? This is a follow-on from 60% RTC #526.	See above			Hualapai reiterates the need to be included (along with DOI and DTSC) as a primary party in communications regarding all project design changes, or work variance requests including material deviations from the design documents and/or C/RAWP due to discovery of changed site conditions as discussed in these earlier comments (at left). Communicating these changes needs to occur as soon as it is known that a change needs to be made. Hualapai needs to be included in those discussions via informing a tribal monitor, or email or telephone calls to designated points of contact. Once the change has been approved then a formal document can be forwarded to Hualapai.	DTSC response: Tribal comment noted.

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915	Cocopah/TRC 60% BOD RTC-526	Non-design	Request for Information	C/RAWP FIGURE 2.3-1 Work Variance Request Form		Please indicate what level of notification the Tribes will receive when a work variance request form is submitted. At what point in the variance review process will Tribes be notified? This is a follow-on from 60% RTC #526.	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	DTSC response: Tribal comment noted.
916	Chemehuevi/ TRC 60% BOD RTC-526	Non-design	Request for Information	C/RAWP FIGURE 2.3-1 Work Variance Request Form		Please indicate what level of notification the Tribes will receive when a work variance request form is submitted. At what point in the variance review process will Tribes be notified? This is a follow-on from 60% RTC #526.	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	DTSC response: Tribal comment noted.
Specific Comments – Construction/Remedial Action Work Plan, Section 3: Construction Methods and Sequencing											
917	DTSC-158	Design	Editorial	3.1 Key Remedy Features for Construction, Page 3-1	"An inner recirculation loop (IRL) comprising: – Extraction wells near the Colorado River (referred to as the River Bank [RB] extraction wells) to provide hydraulic capture of	Revise the cited sentence to better capture the intent of remedy features: "Extraction wells near the Colorado River (referred to as the River Bank [RB] extraction wells) to provide hydraulic capture of Cr(VI) groundwater concentrations, ~~accelerate~~ cleanup ~~of~~ the floodplain downgradient of the IRZ, enhance the flow of contaminated groundwater through the IRZ line, and control migration of IRZ-generated byproducts ~~-~~to~~ward~~ the ~~Colorado River~~ east."	The cited text will be edited as indicated with one modification such that the statement is consistent with IRL DQOs 3 and 4 (O&M Manual Volume 2): "Extraction wells near the Colorado River (referred to as the River Bank [RB] extraction wells) to provide hydraulic capture of	Resolved.			Comment resolved.

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					Cr(VI) groundwater concentrations, accelerate cleanup of the floodplain, enhance the flow of contaminated groundwater through the IRZ line, and control migration of IRZ-generated byproducts toward the Colorado River."		Cr(VI) groundwater concentrations, ~~accelerate~~ cleanup ~~of~~ the floodplain <u>downgradient of the IRZ</u>, enhance the flow of contaminated groundwater through the IRZ line, and control migration of IRZ-generated byproducts ~~toward the Colorado River~~ <u>east</u>."				
918	DOI-148	Non-design	Editorial	Exhibit 3.1-1/3-2	Five East Ravine extraction wells…	Consider adding conversion of MW-70BR-225 (ER-6) for completeness and modify text as appropriate.	The first bullet in the "TCS recirculation loop" section of Exhibit 3.1-1 will be revised as follows: "Five East Ravine extraction wells (plus up to six future provisional wells) <u>and conversion of one existing monitoring well (MW-70BR-225, to be renamed ER-6)</u> downgradient of the TCS in the southeast portion of the plume existing in bedrock"		Resolved.		Comment resolved.
919	DOI-149	Non-design	Editorial	Exhibit 3.1-1/3-3	Other ancillary facilities…	Bullet one will need to be modified based on the selected alternative BCW crossing.	In response to 90% comments (see RTC #19 FMIT-5), the northern and southern BCW crossing design were changed to direct bury pipes/conduits in BCW. Therefore, the first bullet would be removed.		Resolved.		Comment resolved.
920	DTSC-159	Design	Contingencies	Exhibit 3.1-1. Freshwater source/supply well/storage, Page 3-2	"Freshwater supply will be primarily from the existing well HNWR-1A, located on the HNWR in Arizona. Freshwater can also be supplied form the existing nearby well HNWR-1 as a secondary source ~~and~~	Deletion of the cited sentence is requested. If desired, more reasonable alternatives such as Topock 2/3 could be cited as contingent sources. Figure 3.1-3 should label Topock 2/3 as well as the Topock 1 location.	Since Exhibit 3.1-1 (Summary of Engineering Design Parameters and Key Remedy Features) of the C/RAWP is intended to present the planned remedy features, reference to Site B well will be removed from the exhibit. Topock-2/3 wells will be labeled in Figure 3.1-3.	Resolved.			Comment resolved.

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					~~from the existing Site B well approximately 0.9 mile north of the HNWR-1 as a contingent source~~."						
921	DTSC-160	Design	Contingencies	Exhibit 3.1-1. Supporting facilities during remedy O&M, Page 3-3		Add bullet describing the Contingent Freshwater Pre-injection Treatment System illustrated in Figure 3.1-1 and others.	The C/RAWP Exhibit 3.1.-1 is intended to list planned and future provisional features of the remedy. Contingency items are listed in Section 5 (Contingency Plan). If helpful, the following text can be added to the note for Exhibit 3.1-1: "Contingency items such as the Contingent Freshwater Pre-injection Treatment System and the Contingent Dissolved Metals Recovery System are not included in this table; they are listed in the Contingency Plan (see Section 5)."	Resolved.			Comment resolved.
922	DTSC-161	Design	Monitoring	EXHIBIT 3.1-2A. Estimated Borehole Count Associated with Well Construction: Summary, Page 3-4 to 3-8		Well CW-2S should be added to this list as per 60% design comments.	The addition of monitoring well CW-2S was originally requested for inclusion in the groundwater remedy monitoring well network by DTSC in 60% design comment 656 (DTSC-202). Through discussion with DTSC and DOI subsequent to the 60% response to comments in development of the 90% design submittal, it was determined that monitoring well CW-2S could be excluded from the design pending installation of MW-EE (formerly referred to as IRL-3-As-225), which is included in the design as a future provisional monitoring well location.	Resolved.			Comment resolved.
923	JDS-4	Design	Remedial Design	Exhibit 3.3- 3	Schedule Constraints	Construction of FW-1, IRL-3 will constrain construction of Pipeline A because it will reduce access along the access roads and may be noted.	The construction of FW-1 and IRL-3 will be a constraint in terms of access and space available for construction. However, the construction of FW-1 and IRL-3 will not be a			Noted.	

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							constraint in terms of schedule because these elements can all be built in different work packages or even simultaneously, albeit with more congestion. Exhibit 3.3-3 was intended to include only key schedule constraints related to pipelines, not space constraints.				
924	FMIT/TRC	Non-design	CEQA/EIR	C/RAWP PAGE 3- 10 3.2.1.1 Borehole Drilling and Decommissioning	Crew Vehicles and Facilities. Vehicles used by the crew to access the work zone will range from standard highway vehicles to smaller off-highway vehicles. The exact number of vehicles will change depending on location and crew size at a given time but would typically be less than five. Temporary bathroom facilities will typically be in the work zone unless the work zone is within a jurisdictional area such as drainage and washes.	Please indicate where in the Groundwater EIR the placement of toilets on the Cultural landscape was addressed. Also indicate whether Tribal input will be requested regarding the placement of toilets.	The EIR addresses the impacts of construction on the Topock Cultural Area. (See EIR, Vol. 2, pp. 4.4-60–4.4-68.) The EIR also disclosed that during construction and operations, personnel would be on site all day, and that there would be staging areas with field trailers and other places associated with accommodating the needs of field workers. (See EIR, Vol. 2, pp. 3-20–3-26.) While toilet locations are not specifically addressed in the EIR, temporary facilities including portable toilets are widely used in construction projects, and their impact was accounted for in the EIR's programmatic analysis of construction and operation impacts. Portable toilets are provided for sanitary purpose and to keep the construction areas clean. In general, these facilities are mobilized to the site prior to construction and their placement is determined during the site preparation and demarcation activities for specific construction areas, as described in C/RAWP Section 4.2.3. Tribal monitors are invited to participate in/observe the site preparation and demarcation activities.			Noted.	
925	Hualapai/TRC	Non-design	CEQA/EIR	C/RAWP PAGE	Crew Vehicles	Please indicate where in the Groundwater EIR the placement of toilets on the Cultural landscape	See above			Noted.	

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				3- 10 3.2.1.1 Borehole Drilling and Decommissioning	and Facilities. Vehicles used by the crew to access the work zone will range from standard highway vehicles to smaller off-highway vehicles. The exact number of vehicles will change depending on location and crew size at a given time but would typically be less than five. Temporary bathroom facilities will typically be in the work zone unless the work zone is within a jurisdictional area such as drainage and washes.	was addressed. Also indicate whether Tribal input will be requested regarding the placement of toilets.					
926	Cocopah/TRC	Non-design	CEQA/EIR	C/RAWP PAGE 3- 10 3.2.1.1 Borehole Drilling and Decommissioning	Crew Vehicles and Facilities. Vehicles used by the crew to access the work zone will range from standard highway vehicles to smaller off-highway vehicles. The exact number of vehicles will change depending on location and crew size at a given time but would typically be less than five. Temporary bathroom facilities will typically be in the work zone	Please indicate where in the Groundwater EIR the placement of toilets on the Cultural landscape was addressed. Also indicate whether Tribal input will be requested regarding the placement of toilets.	See above			Noted.	

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					unless the work zone is within a jurisdictional area such as drainage and washes.						
927	Chemehuevi/ TRC	Non-design	CEQA/EIR	C/RAWP PAGE 3- 10 3.2.1.1 Borehole Drilling and Decommissioning	Crew Vehicles and Facilities. Vehicles used by the crew to access the work zone will range from standard highway vehicles to smaller off-highway vehicles. The exact number of vehicles will change depending on location and crew size at a given time but would typically be less than five. Temporary bathroom facilities will typically be in the work zone unless the work zone is within a jurisdictional area such as drainage and washes.	Please indicate where in the Groundwater EIR the placement of toilets on the Cultural landscape was addressed. Also indicate whether Tribal input will be requested regarding the placement of toilets.	See above			Noted.	
928	DTSC-162	Design	Remedial design	3.2.1.1 Borehole Drilling and Decommissioning, Hollow-stem Auger. Page 3-12	"…however, it is possible that the method might prove useful for the installation of some wells such as the shallower wells near the southern end of the NTH IRZ, where the thickness of the unconsolidated material above bedrock is relatively thin and the depth	Revise the text to further indicate that HSA is not recommended at the site as it can lead to misinterpretation of the bedrock contact. The presence of a boulder can halt drilling with HSA. DTSC does not recommend HSA in most situations at the Topock site.	PG&E agrees that hollow-stem auger (HSA) is not a preferred method of borehole drilling at the site when the determination of the depth to bedrock is included as an objective for the borehole. It is anticipated that the majority of borehole drilling will be conducted using the rotary drilling with casing advance and rotosonic methods. However, HSA may be appropriate for constructing infrastructure that is not	Resolved.			Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					to water is shallow."		designed based on the depth to bedrock, such as a conductor casing (i.e., carrier casing) or a relatively shallow, small diameter well. The first sentence of the second paragraph in the "Hollow-stem Auger" portion of Section 3.2.1.1 will be revised as follows: "This method is typically not used at Topock because of the rocky lithology throughout the site, which can lead to misinterpretation of the bedrock contact,.".				
929	DTSC-163	Design	Remedial design	3.2.1.1 Borehole Drilling and Decommissioning, Drilling Fluid. Page 3-12	"Examples of potential additives include foaming agents (Baroid Quik Foam), bentonite-based products, and fluid control additives (soda ash, Baroid Quik Gel, Quik-Trol, EZ-Mud, Penetrol, and N-Seal). The function of some example drilling additives and the example ingredients are included in Exhibit 3.2-1."	Exhibit 3.2-1 indicates that a variety of drilling additives are organic based (e.g., ethanol, light petroleum distillate, polysaccharide). Add a discussion to the section addressing what the affects the fluids could have on the representativeness of groundwater sampling results. DTSC is concerned that the mud additives could become entrained via the filter cake/skin along the borehole wall and become lodged in the formation for some time. Adding such organics as ethanol additives to a monitoring well environment at the site could alter the redox and geochemistry and provide misleading laboratory results. The discussion should conclude that additives should be avoided and that if utilized, they should be well documented in logs, yet also discussed in the text of reports so as to alert a reviewer.	The following text will be added to the end of the referenced section: "The use of some drilling fluid additives (e.g., organic based additives), if not completely removed during the drilling and well development process, could alter the redox and geochemical environment in the aquifer proximate to the given borehole. This could lead to misleading laboratory results for groundwater samples collected during the time these additives persist in the aquifer. For this reason, in addition to the general objective of trying to minimize the amount of foreign material introduced to the subsurface during drilling, well construction and development, additives should be avoided to the extent possible. If additives are utilized the types and volumes used as well as the volumes of drilling fluid returned during drilling and the volume of groundwater removed during well	Resolved.			Comment resolved.

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							development will be documented in field logs and associated reports, and the potential effects of the additives on groundwater sample laboratory results will be presented along with the data."				
930	DTSC-164	Design	Remedial design	3.2.1.1 Borehole Drilling and Decommissioning, Borehole Decommissioning. Page 3-13 and 3-14.	"PG&E will propose to temporarily backfill the boreholes by allowing it to either naturally collapse or with the placement of clean granular material (sand)." "It is assumed that temporarily backfilled boreholes will be overdrilled within 3 to 4 months for well construction."	DTSC does not support collapse of boreholes as a planned backfill procedure as a collapse does not meet decommissioning standards for protecting aquifers. Returning to a collapsed hole, potentially 3 to 4 months later, offers no guarantee that an overdrill will stay plumb and on target and chase the collapse to total depth so that it can be completed as a well or be properly decommissioned. Of course, collapses in areas that are contaminated can exacerbate environmental conditions. Further discussion is requested to see if alternatives exist and what can be done to eliminate or minimize this practice.	The proposed practice of temporarily decommissioning a borehole as proposed in the reference section is seen by PG&E as an approach to remedy construction that is critical to both the performance of the remedy and the minimization of the total number of boreholes drilled during the project. If these boreholes are not permitted to naturally collapse, then the borehole must either be sealed using sealing material, or backfilled with clean (i.e., imported) granular material. As discussed in this section, if sealing material is used to backfill these boreholes, there is risk that a new borehole would be needed for the planned well to function properly. PG&E prefers to avoid backfilling with imported material to the extent possible because upon over-drilling it will not be practicable to separate the imported material from the formation material. If this material is ultimately reused on site (determined to be clean) then the practice will result in an increased volume of imported material being disposed onsite. The second paragraph of the referenced text will be modified as follows	DTSC is directing PG&E to eliminate or minimize the proposed practice of temporarily backfilling boreholes that will be overdrilled at a later date. The practice could lead to creating aquifer interconnections and potentially allow for mixing of contaminated or geochemically dissimilar waters. After discussion with PG&E consultants, it is understood that this practice is only being proposed along the IRZ line where select, large diameter, IRZ wells will be installed after a smaller diameter pilot boring has first been completed. DTSC is not allowing this practice to be used at any monitoring well installations. DTSC believes the proposed practice can be overcome by carefully planned drill rig scheduling and quick turnaround times for any critical laboratory data. For example, after a smaller diameter sonic rig completes the pilot boring and			DTSC response: comment resolved pending revision of document in final design.

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							to more clearly indicate that PG&E will only implement this approach if a permit variance is approved by the appropriate permitting agency prior to construction: "…however, prior to drilling, PG&E will seek a variance to this approach with the appropriate permitting agency (San Bernardino County or Arizona Department of Water Resources) when a borehole is only to be temporarily backfilled.	rush lab data are obtained, IRZ well design could then be finalized At that point the sonic rig would pull off the hole (without encouraging borehole collapse) and the large diameter drill rig could move over and complete the large diameter borehole and well. In the event that the proposed borehole collapse/temporary backfill method is desired by PG&E (e.g., due to unforeseen events such as drill rig failure), PG&E must first notify DTSC and obtain approval to proceed. This way DTSC will be more informed regarding site specific details and understand the entire scope of the proposal at the time it is proposed to be implemented. It is recommended that the document be revised to capture the salient points above.			
931	DOI-150	Non-design	Remedial Design	3.2.1.1/3-13	Borehole Stabilization.	A discussion should be provided within this section regarding the potential use of cement bentonite grout in the event of a surface slumping event, such as the event that occurred during FW HNWR-B construction.	The referenced text will be modified as follows: "During drilling, as was experienced during the installation of the freshwater supply well at Site B in Arizona, field conditions might require that a borehole be stabilized to prevent an unsafe working condition or limit the amount of formation material that is removed during drilling. This is typically addressed by using the drill rig to		Resolved.		Comment resolved.

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							install a temporary or permanent conductor casing in the shallower portion of the borehole, or by filling the borehole with drilling fluid (as described in the previous section) to control borehole pressure. Temporary conductor casings, which could simply be larger-diameter sections of drilling pipe, are removed when drilling is complete, whereas permanent casings are incorporated into the design of a given well construction. <u>As was the case at Site B, if void space around the borehole which can lead to slumping of the ground surface must be stabilized, then an appropriate material like cement bentonite grout must be used to fill the void created by the unstable borehole.</u>				
932	DTSC-165	Design	Remedial design	3.2.1.2 Borehole Groundwater Sample Collection. Page 3-15 and 3-16.	"Borehole groundwater samples will be collected from specific intervals of select boreholes drilled within the unconsolidated aquifer. When the water table is reached, samples will be collected from the borehole approximately every 30 to 50 feet…One exception to this frequency is when borehole groundwater samples are being collected to support the design of a well	PG&E needs to define "select boreholes". The document should be revised to clearly list the boreholes currently planned for sampling. DTSC assumes most monitoring, IRZ and FW-2 area boreholes would be included in this sampling. It will probably be easier to list those wells to be excluded. DTSC requests that samples also be collected at potentially repetitive horizons, but at lesser frequencies (e.g., every 75 feet). These samples could assess aquifer heterogeneity and assist in plume delineation and the development of the CSM.	A table will be added to the referenced section that defines which planned boreholes will be used for groundwater sample collection during drilling. This table will include a note that the plan is subject to change based on observations in the field. The table was developed during the 90% RTC process ad included in **Attachment T** of the final RTC table. In all likelihood, field observation will lead to more boreholes being utilized for groundwater sample collection as opposed to less. In addition, the text in Section 3.2.1.2 (Data Collection During Well Construction), Borehole Groundwater Sample Collection subsection, 2nd paragraph, 3rd sentence, will be modified to explicitly	DTSC requests that the following wells be added to Attachment T: H, L, M, N, and Y. These wells are generally located in areas with sparse well density and larger aquifer thicknesses. Finally, it is recommended that MW-U be identified as a Category 1 well as results from the well might alter the location of IRL-4 and associated wells.			**Attachment T** was revised to incorporate DTSC's request.

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					that will supplement an existing well. For example, if a well is being installed to evaluate deeper water quality where a water table well already exists, samples will typically only be collected from depths deeper than the existing well screen interval(s)."		indicate the referenced sample collection frequency will only be modified at existing MW locations: ~~One~~ The only exception to this frequency is when borehole groundwater samples are being collected to support the design of a well that will supplement an existing well (i.e. "twinned" wells at the same location). It is PG&E's opinion that collecting borehole groundwater samples at the same depths as existing monitoring well screens with the intent of comparing the results of the borehole samples with that from the monitoring wells will not provide particularly useful information. The primary reason for this is that samples from the borehole might not be representative of the same depth interval or the same flow condition that is effectively sampled from an established monitoring well screen. Different sampling purge methods are also used for the two sample types. It is understood that DTSC would like to use this information to try and determine if borehole samples are biasing higher or lower than the well samples, but this comparison could be misleading for the reason mentioned in the previous sentence. PG&E appreciates DTSC's consideration to increase the distance between borehole groundwater samples to offset the additional samples collected at existing screened depths, but would prefer				

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							to maintain the frequency currently included in the C/RAWP (approximately every 30-50 feet) without collecting samples at existing screened depths, or with the addition of specific existing screened depths directed by DTSC.				
933	DTSC-166	Design	Remedial design	3.2.1.2 Borehole Geophysical Logging. Page 3-16.	"The determination to conduct borehole geophysical logging will be made in the field when drilling conditions are appropriate and as needed to finalize design details for the remedy well network."	Plans to conduct geophysical logging should also be planned as part of this document. Revision requested. Additionally, for all bedrock wells, the document should be revised to indicate that a standard suite of geophysical logs (e.g., caliper, acoustic televiewer, video, borehole flow tests) will be used.	While this section identifies the types of geophysical logging that might be conducted during the construction of the remedy well network, geophysical logging is not anticipated to be conducted regularly. It is estimated that the majority if not all of the boreholes drilled for pilot data collection or well construction in the unconsolidated aquifer will be installed using casing advance methods (e.g., rotosonic and rotary drilling with casing advance), which will result in a steel-cased borehole to total depth. The steel casing precludes the use of the majority of the listed geophysical logging techniques with the exception of natural gamma ray logging, which is primary used to log clay units (clays have only been very sparsely logged in the unconsolidated aquifer based on review of existing boring logs). Further, continuous core will be collected from many of the boreholes drilled for remedy well construction, which will provide better lithologic data than geophysical logging. Based on lithologic logging of bedrock core, geophysical logging, and borehole flow testing conducted during	Okay.			Comment resolved.

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							investigation of the bedrock aquifer in the East Ravine area, the geophysical logging data was only of marginal value. Although geophysical logging data was collected early in the investigation it was later discontinued when it was determined that observation of the bedrock core in combination with borehole flow testing provided the best data set to determine which intervals of fractured rock were responsible for groundwater flow. The only planned bedrock boreholes that will be installed for the groundwater remedy includes the line of East Ravine extraction wells and MW-70BR-D. As discussed in Sections 3.2.1.1 and 3.2.1.4, MW-70BR-D will be used to provide vertical characterization of Cr(VI) in bedrock and will be installed like other boreholes used for East Ravine characterization with the collection of bedrock core and the use of borehole flow testing, as determined necessary (if depth-specific concentration data is determined necessary based on groundwater sample results collected from the open borehole). As discussed in Section 3.2.1.4, the line of East Ravine injection wells will be constructed to provide hydraulic capture of Cr(VI)-impacted groundwater in bedrock. It is PG&E's opinion that geophysical logging and borehole flow testing is not necessary to meet this objective; however, should questions arise				

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							about the performance of these wells after they are constructed and operational then the full suite of geophysical logging is available to the project at that time. See RTC 951 (DTSC-172) where text has been added to the end of the "Well performance" bullet within the "East Ravine (ER) Extraction Wells" section of Section 3.2.1.4 of the C/RAWP to clarify the potential application of geophysical logging at the East Ravine extraction wells. Text will be added to Section 3.2.1.4 (Well Construction and Development), East Ravine Extraction well subsection, to indicate that caliper and borehole tele-viewer logs will be conducted in these wells following development to assess the baseline physical borehole condition.				
934	FMIT/TRC	Non-design	Monitoring	C/RAWP Page 3-16 3.2.1.2 Data Collection during Well Construction - Borehole Ground-water Sample Collection	Water quality measurements will be monitored on the pump effluent at the surface (for example, specific conductance, pH, and oxidation-reduction potential), and the temporary screen will be considered developed (ready for sample collection) once measurements are indicative of estimated aquifer conditions as compared to	Please indicate if water temperature will be evaluated and if not provide an explanation why this measurement is not important.	Temperature is a standard field parameter that is measured and recorded when collecting water quality measurements. The referenced text will be modified to explicitly include temperature, as follows: "Water quality measurements will be monitored on the pump effluent at the surface (for example, specific conductance, pH, <u>temperature,</u> and oxidation-reduction potential), and the temporary screen will be considered developed (ready for sample collection) once measurements are indicative of estimated aquifer conditions as compared to the water			Noted.	

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					the water used for drilling (for example, elevated specific conductance when compared to lower specific conductance drilling water).		used for drilling (for example, elevated specific conductance when compared to lower specific conductance drilling water)."				
935	Hualapai/TRC	Non-design	Monitoring	C/RAWP Page 3-16 3.2.1.2 Data Collection during Well Construction - Borehole Ground-water Sample Collection	Water quality measurements will be monitored on the pump effluent at the surface (for example, specific conductance, pH, and oxidation-reduction potential), and the temporary screen will be considered developed (ready for sample collection) once measurements are indicative of estimated aquifer conditions as compared to the water used for drilling (for example, elevated specific conductance when compared to lower specific conductance drilling water).	Please indicate if water temperature will be evaluated and if not provide an explanation why this measurement is not important.	See above			Noted.	
936	Cocopah/TRC	Non-design	Monitoring	C/RAWP Page 3-16 3.2.1.2 Data Collection during Well Construction - Borehole Ground-water Sample Collection	Water quality measurements will be monitored on the pump effluent at the surface (for example, specific conductance, pH, and oxidation-	Please indicate if water temperature will be evaluated and if not provide an explanation why this measurement is not important.	See above			Noted.	

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					reduction potential), and the temporary screen will be considered developed (ready for sample collection) once measurements are indicative of estimated aquifer conditions as compared to the water used for drilling (for example, elevated specific conductance when compared to lower specific conductance drilling water).						
937	Chemehuevi/ TRC	Non-design	Monitoring	C/RAWP Page 3-16 3.2.1.2 Data Collection during Well Construction - Borehole Ground-water Sample Collection	Water quality measurements will be monitored on the pump effluent at the surface (for example, specific conductance, pH, and oxidation-reduction potential), and the temporary screen will be considered developed (ready for sample collection) once measurements are indicative of estimated aquifer conditions as compared to the water used for drilling (for example, elevated specific conductance when	Please indicate if water temperature will be evaluated and if not provide an explanation why this measurement is not important.	See above			Noted.	

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					compared to lower specific conductance drilling water).						
938	DTSC-167	Design	Remedial design	3.2.1.2 Well Sampling. Page 3-17.	"Groundwater samples will be collected from select wells to guide decisions during construction of the well network. For example, as detailed in Section 3.2.1.3, water quality samples will be collected and analyzed from key wells (referred to as Category 1) to determine proper siting of key extraction, injection, and monitoring wells."	The document should also discuss sampling new wells to develop baseline data for each well. This should consist of a wide suite of constituents (e.g., general mineral, metals scan). These data will be needed as the remedy progresses and will assist in understanding plume movement. The baseline data should be collected before the remedy becomes operational and should be conducted for several quarters as it may take certain wells extended periods of time to equilibrate with the aquifer.	A new Section 3.2.1.6, Baseline Well Sampling, will be added to the C/RAWP. This section will detail the plans and methods to collect initial baseline samples from all new extraction, injection, and monitoring wells constructed as part of the groundwater remedy. The analytical suite for baseline groundwater samples collected from injection and extraction wells will be consistent with the analytes listed in Exhibit 4.1-1 (Biological and Geochemical Analytical Monitoring Parameters) of the O&M Manual (Volume 1). The analytical suite for baseline groundwater samples collected from monitoring wells will include: total organic carbon, total dissolved solids, title 22 metals (total and dissolved), Cr(VI), iron and manganese (total and dissolved), cations (total calcium, potassium, magnesium, and sodium), and anions (chloride, fluoride, bromide, nitrate, nitrite, and sulfate). The new Section 3.2.1.6 was developed during the 90% RTC period and included in **Attachment U** of the final RTC table.	Resolved.			Comment resolved.
939	DTSC-168	Design	Remedial design	3.2.1.2 Data Collection during Well Construction. Page 3-17.		The document should also discuss conducting aquifer tests (either injection or pumping) to assist in selecting monitoring well screen locations in hydraulically connected portions of the aquifer. See the DTSC comment above regarding citing well screens for wells MW-FF and GG based on an aquifer test conducted at IRL-4. Hydraulic parameters obtained from aquifer tests would also be used to update the groundwater model and make future modeled estimates more reliable.	PG&E agrees that the hydraulic parameters obtained from aquifer tests will be useful for updating the groundwater model. The approach to aquifer testing is presented in Section 3.2.1.5 of the C/RAWP.				DTSC Response: Resolved. Agencies will provide direction to PG&E regarding aquifer testing.

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							It is PG&E's technical opinion that aquifer testing is not necessary or appropriate for designing monitoring wells as specified in the comment. The unconsolidated aquifer at Topock is one continuous water bearing unit with no confining units, and given the depositional environment of the sediments (as confirmed by existing boring logs), is heterogeneous. The drawdown observed in monitoring wells screens at one location during an aquifer test will not conclusively identify preferential groundwater flow pathways that will correlate to another monitoring location, especially one that is a greater distance from the given pumping well. It is PG&E's understanding the DSTC is most interested in using aquifer testing to design monitoring wells for the arsenic monitoring wells; however, these wells, like other wells with the objective to monitor gross changes in water quality within the aquifer, will be designed with relatively long screened intervals (20-50 feet in length). This will result in the monitoring of a relatively large percentage of the overall aquifer saturated thickness and minimize the potential for "missing" key portions of the aquifer. The screen intervals chosen for arsenic monitoring wells, and all other monitoring wells, will be based on lithologic core and depth-specific borehole groundwater				

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							samples from the same or nearby boreholes. This process for using borehole data to select monitoring well screen intervals has been successfully utilized for years at the Topock site to construct the majority of the existing monitoring well network and will be effective for the expansion of the monitoring network as part of groundwater remedy construction.				
940	DTSC-169	Design	Remedial design	3.2.1.3 Approach to Finalizing Well Design and/or Siting Page 3-17.		The intent of the well categories is not clear in the introduction. It appears the intent is to sequence Category 1 wells first and so on as mentioned on page 3-18. The rationale for designating the wells as Category 1 should be made more explicit. (e.g., install wells in IRL area to confirm chromium plume location –see Table 3.2-6). Not quite certain why MW-70BR-D is included as Category 1. It was assumed NTH IRZ wells would be Category 1 to confirm bedrock depths and plume distribution via borehole grab samples. Associated IRZ monitoring wells and downgradient monitoring wells could then be adjusted based on that data. MW-A might be replaced by IRZ-1 pilot boring. Could adjust River Bank extractors as well if needed. DTSC wants the arsenic monitoring wells to go in last (Category 3) to ensure they are properly screened using all other sources of data because the proposed plan has limited the number of screened intervals. Wells MW-10D and 11D should be Category 1 of 2 as they are a trigger for Well V which needs to be added to Figure 3.2-1.	Given the additional data that will be collected and considered in the process of finalizing well designs, the intent of the well categories is to group well locations as defined by the types of decisions that will be made related to well design (all categories) and in some cases well siting (Category 1). Please note that the well category (1, 2, or 3) is not necessarily indicative of when in the schedule a well will be constructed. For example, while Category 1 wells will be sequenced early in the project, the pilot boreholes for select Category 3 locations will also be installed early in the schedule (ahead of data collection at some Category 2 well locations). As defined in Exhibit 3.2-2 data that will be collected at Category 1 well locations will be used to finalize the locations and/or design of other remedy wells. In the case of MW-70BR-D, as presented on Table 3.2-6, data collected at this location will be used to determine if East Ravine extraction wells will function properly at	Okay.			Comment resolved.

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							the designed total depth; this will not affect East Ravine extraction well siting but could affect design (i.e., depth). In the case of the NTH IRZ well locations, they have been largely designated as Category 3 locations because while data collected from these locations will be used to finalize the design of these and other nearby wells, the location of these and other wells is not dependent on the data. PG&E agrees that bedrock depth and plume distribution data (collected from borehole groundwater samples) is important to finalize the design of these wells, and this data will be collected from an initial group of pilot boreholes (see RTC #945, DTSC-170). Planned monitoring well locations on the flood plain, including MW-A are located with specific objectives given the planned location of remediation wells and would not be expected to move. Regarding the adjustment of planned River Bank extraction well locations, it is PG&E's opinion that the wells are currently located in the appropriate locations to achieve their objectives. While data collected from these and nearby boreholes will be used to finalize extraction well design, the data is not anticipated to require changes in well location. If operational data suggest that additional River Bank extraction wells are required to achieve the stated objectives then				

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							future provisional wells will be sited and constructed as informed by data collected during system operation. See RTC #939 (DTSC-168) for additional discussion related to the design of arsenic monitoring wells. Given the planned proximity to planned injection wells, in some cases the arsenic monitoring well locations provide an opportunity to confirm key assumptions prior to construction of the larger footprint remediation wells and associated pipelines (MW-BB, MW-DD, and MW-FF; see Table 3.2-6); therefore, they are considered for installation early in construction. In light of discussion with DTSC and proximity to sensitive cultural resources, MW-DD will be sequenced as late as possible in the Category 1 well locations. Arsenic monitoring wells that aren't as well located to confirm these assumptions would be sequenced later in the construction once the associated injection well location is finalized (e.g., MW-AA, CC, GG, HH, and II). As requested by DTSC, monitoring wells MW-Z, MW-10D, and MW-11D will be reclassified as Category 1 well locations given the results of data collected from these wells will be used to determine if monitoring well location MW-V should be constructed.				
941	FMIT/TRC	Non-design	Request for Information	C/RAWP 3.2.1.2 p. 3-17 Data Collection	Groundwater samples will be collected from select wells to	What level of review will the Tribes have of the groundwater samples that are collected and used to guide decisions during construction of the well network?	As stated in C/RAWP Exhibit 2.6-2 (Monthly Progress Report Template) under			The Tribe reiterates the desire to be included along with DOI and DTSC as primary parties	DTSC response: Tribal comment noted.

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				during Well Construction - Well Sampling.	guide decisions during construction of the well network.	The Tribes request continued involvement at the level that has currently existed through the design stage during and post the construction phase of the groundwater remedy system. Please discuss in detail PG&E's and DTSC's intent on Tribal involvement post the design phase of the project.	"Description of Activities and Work Completed", data collected (generated or received) will be described in the monthly progress reports during construction. A summary of the lithologic and water quality data collected during well installation will be provided in the monthly progress reports (see C/RAWP Section 3.2.1.3, Approach to Finalizing Well Design and/or Siting). The monthly progress reports will be submitted to DTSC and DOI, and also posted on a SharePoint site for access by Tribes and stakeholders (see C/RAWP Section 2.6.2.4). PG&E also currently holds monthly meetings with Tribes to address current issues and provide a forecast of upcoming activities. Other communications may take place depending on purpose of the communication and type of information to be exchanged. Tribes are welcome to request discussions of specific topics or information that are of interest to the Tribes during these information exchanges. The nature and pace of activities during the construction phase will be very different from those experienced during the design, and will be more field focused. Table 2.3-1 presents the proposed communication framework for construction and startup, including communication of data collected during construction of the groundwater remedy			to which communication is addressed if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape. PG&E should remain mindful of its independent legal obligations under the 2006 Settlement Agreement to consult with FMIT and to provide all non-attorney-client privileged material information, documentary or otherwise, to the Tribe contemporaneously with its receipt or development by PG&E.	

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							well network. As shown in Table 2.3-1, PG&E will send routine notification to Tribes and others of planned construction and field activities. PG&E also commits to conduct outreach with the Tribes under the terms of any MOUs in effect with various Tribes, the 2006 Settlement Agreement with the FMIT, and protocols specified in the EIR, CIMP, the PA, and the CHPMP, many of which are listed in RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, and #47 Chemehuevi/TRC.				
942	Hualapai/TRC	Non-design	Request for Information	C/RAWP 3.2.1.2 p. 3-17 Data Collection during Well Construction - Well Sampling.	Groundwater samples will be collected from select wells to guide decisions during construction of the well network.	What level of review will the Tribes have of the groundwater samples that are collected and used to guide decisions during construction of the well network? The Tribes request continued involvement at the level that has currently existed through the design stage during and post the construction phase of the groundwater remedy system. Please discuss in detail PG&E's and DTSC's intent on Tribal involvement post the design phase of the project.	See above			Hualapai reiterates the need to be included (along with DOI and DTSC) as a primary party in communications regarding all project design changes, or work variance requests including material deviations from the design documents and/or C/RAWP due to discovery of changed site conditions as discussed in these earlier comments (at left). Communicating these changes needs to occur as soon as it is known that a change needs to be made. Hualapai needs to be included in those discussions via informing a tribal monitor, or email or telephone calls to designated points of contact. Once the change has been approved then a formal document can be forwarded to Hualapai.	DTSC response: Tribal comment noted.
943	Cocopah/TRC	Non-design	Request for Information	C/RAWP 3.2.1.2 p. 3-17 Data Collection during Well Construction - Well Sampling.	Groundwater samples will be collected from select wells to guide decisions during construction of	What level of review will the Tribes have of the groundwater samples that are collected and used to guide decisions during construction of the well network? The Tribes request continued involvement at the level that has currently existed through the design stage during and post the construction phase of the groundwater remedy system. Please discuss in detail PG&E's and DTSC's intent on Tribal involvement post the design phase of the project.	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work	DTSC response: Tribal comment noted.

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					the well network.					plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	
944	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP 3.2.1.2 p. 3-17 Data Collection during Well Construction - Well Sampling.	Groundwater samples will be collected from select wells to guide decisions during construction of the well network.	What level of review will the Tribes have of the groundwater samples that are collected and used to guide decisions during construction of the well network? The Tribes request continued involvement at the level that has currently existed through the design stage during and post the construction phase of the groundwater remedy system. Please discuss in detail PG&E's and DTSC's intent on Tribal involvement post the design phase of the project.	See above			The Tribes reiterate the desire to be included along with DOI and DTSC as primary parties communication is addressed to if material deviation from work plan and design documents, MMRP action specific, and location specific ARARs occur. The current proposed use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape.	DTSC response: Tribal comment noted.
945	DTSC-170	Design	Remedial design	3.2.1.3 Approach to Category 3 Locations. Page 3-19.	"Borehole data will be collected from pilot boreholes at an initial group of Category 3 well locations to finalize well design at these locations: IRZ-1, -5, -9, -13, -15, -20, -27, and -35."	Add IRZ-11 and IRZ-17 to the list if the plan remains to do the IRZ line last. However, DTSC recommends pilot borings for most IRZ wells and that they should be done early to guide monitoring well design.	IRZ-11 and IRZ-17 will be added to the list of IRZ well locations where pilot boreholes will be initially conducted. The referenced text will be modified as follows: "Borehole data will be collected from pilot boreholes at an initial group of Category 3 well locations to finalize well design at these locations: IRZ-1, -5, -9, <u>-11,</u> -13, -15, <u>-17,</u> -20, -27, and -35." Please note that the well category (1, 2, or 3) is not necessarily indicative of when in the schedule a well will be constructed, and that it	Resolved.			Comment resolved.

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							is not accurate that the IRZ line will be constructed last, as indicated in the comment. Regardless, pilot boreholes will be drilled to collect data that will be used to finalize IRZ well design (and potentially other nearby wells). It is possible that based on this initial pilot borehole dataset from the IRZ line that PG&E will determine additional pilot boreholes are needed at other planned well locations to finalize the design of IRZ wells for a given area.				
946	FMIT/TRC 1n	Non-design	Request for Information	3.2.1.3 Approach to Finalizing Well Design and/or Siting	Category 1 wells have been designated in areas where existing uncertainties in the current conceptual site model may drive final well siting and/or design, as well as the other associated remedy infrastructure (pipelines). These areas include the northern area of the NTH IRZ, the IRL injection area in the uplands, the southern freshwater injection well (FW-2) area, and the East Ravine area. In each of these areas, an already planned monitoring well has been designated as the Category 1 well location. Data collection	Much collaborative been invested on the part of the Tribes to locate exact well locations. The text however appears to indicate that the well locations have not been finalized and final locations will be decided at a later date. Please indicate what level of continued involvement the Tribes will have in both the review of collected data and in decision process for the locations “other wells and remedy infrastructure”. Please also state why the Tribes are not directly included in the review of the monthly progress reports.	Please see RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, #47 Chemehuevi/TRC, #180 FMIT/TRC-1c, #181 Hualapai/TRC-1c, #182 Cocopah/TRC-1c, #183 Chemehuevi/TRC-1c, #201 FMIT/TRC-1d, #202 Hualapai/TRC-1d, #203 Cocopah/TRC-1d, #204 Chemehuevi/TRC-1d, #941 FMIT/TRC, #942 Hualapai/TRC, #943 Cocopah/TRC, and #944 Chemehuevi/TRC. The comment is inaccurate. As stated in Section 2.6.2.4 (Retention and Reporting), deliverables during the groundwater construction and startup, such as the monthly progress reports and the Construction Completion Report, will be submitted to DTSC and DOI in electronic format. Deliverables will also be posted to a SharePoint site for DTSC, DOI, and/or stakeholder review.			Please see response to comment FMIT/TRC RTC #44.	DTSC response: Tribal comment noted.

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					at these locations will be scheduled early in the construction schedule to confirm the assumptions in the basis of design for these areas prior to moving forward with the construction of other wells and remedy infrastructure. This approach will minimize the potential for uncertainties in the conceptual site model to cause unnecessary disturbance (that is, avoid constructing unnecessary infrastructure). If the borehole data collected confirm the key assumptions used in the basis of design, the Category 1 monitoring well will be constructed consistent with the design detailed in Table 3.2-6 as a design basis and as appropriate based on the borehole data collected. A summary of the lithologic and water quality data collected will be communicated to the agencies via monthly						

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					progress reports as defined in Section 2 of this C/RAWP.						
947	Hualapai/TRC 1n	Non-design	Request for Information	3.2.1.3 Approach to Finalizing Well Design and/or Siting	Category 1 wells have been designated in areas where existing uncertainties in the current conceptual site model may drive final well siting and/or design, as well as the other associated remedy infrastructure (pipelines). These areas include the northern area of the NTH IRZ, the IRL injection area in the uplands, the southern freshwater injection well (FW-2) area, and the East Ravine area. In each of these areas, an already planned monitoring well has been designated as the Category 1 well location. Data collection at these locations will be scheduled early in the construction schedule to confirm the assumptions in the basis of design for these areas prior to moving forward with the construction of	Much collaborative been invested on the part of the Tribes to locate exact well locations. The text however appears to indicate that the well locations have not been finalized and final locations will be decided at a later date. Please indicate what level of continued involvement the Tribes will have in both the review of collected data and in decision process for the locations "other wells and remedy infrastructure". Please also state why the Tribes are not directly included in the review of the monthly progress reports.	See above			See response to comment Hualapai/TRC RTC #83.	DTSC response: Tribal comment noted.

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					other wells and remedy infrastructure. This approach will minimize the potential for uncertainties in the conceptual site model to cause unnecessary disturbance (that is, avoid constructing unnecessary infrastructure). If the borehole data collected confirm the key assumptions used in the basis of design, the Category 1 monitoring well will be constructed consistent with the design detailed in Table 3.2-6 as a design basis and as appropriate based on the borehole data collected. A summary of the lithologic and water quality data collected will be communicated to the agencies via monthly progress reports as defined in Section 2 of this C/RAWP.						
948	Cocopah/TRC 1n	Non-design	Request for Information	3.2.1.3 Approach to Finalizing Well Design and/or Siting	Category 1 wells have been designated in areas where existing uncertainties in the current conceptual site model may drive final well	Much collaborative been invested on the part of the Tribes to locate exact well locations. The text however appears to indicate that the well locations have not been finalized and final locations will be decided at a later date. Please indicate what level of continued involvement the Tribes will have in both the review of collected data and in decision process for the locations “other wells and remedy infrastructure”. Please also state why the Tribes are not directly included in the review of the monthly progress reports.	See above			See response to Cocopah RTC #84.	DTSC response: Tribal comment noted.

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					siting and/or design, as well as the other associated remedy infrastructure (pipelines). These areas include the northern area of the NTH IRZ, the IRL injection area in the uplands, the southern freshwater injection well (FW-2) area, and the East Ravine area. In each of these areas, an already planned monitoring well has been designated as the Category 1 well location. Data collection at these locations will be scheduled early in the construction schedule to confirm the assumptions in the basis of design for these areas prior to moving forward with the construction of other wells and remedy infrastructure. This approach will minimize the potential for uncertainties in the conceptual site model to cause unnecessary disturbance (that is, avoid constructing unnecessary						

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					infrastructure). If the borehole data collected confirm the key assumptions used in the basis of design, the Category 1 monitoring well will be constructed consistent with the design detailed in Table 3.2-6 as a design basis and as appropriate based on the borehole data collected. A summary of the lithologic and water quality data collected will be communicated to the agencies via monthly progress reports as defined in Section 2 of this C/RAWP.						
949	Chemehuevi/ TRC 1n	Non-design	Request for Information	3.2.1.3 Approaching to Finalizing Well Design and/or Siting	Category 1 wells have been designated in areas where existing uncertainties in the current conceptual site model may drive final well siting and/or design, as well as the other associated remedy infrastructure (pipelines). These areas include the northern area of the NTH IRZ, the IRL injection area in the uplands, the southern freshwater	Much collaborative been invested on the part of the Tribes to locate exact well locations. The text however appears to indicate that the well locations have not been finalized and final locations will be decided at a later date. Please indicate what level of continued involvement the Tribes will have in both the review of collected data and in decision process for the locations "other wells and remedy infrastructure". Please also state why the Tribes are not directly included in the review of the monthly progress reports.	See above			See Chemehuevi/TRC RTC #85.	DTSC response: Tribal comment noted.

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					injection well (FW-2) area, and the East Ravine area. In each of these areas, an already planned monitoring well has been designated as the Category 1 well location. Data collection at these locations will be scheduled early in the construction schedule to confirm the assumptions in the basis of design for these areas prior to moving forward with the construction of other wells and remedy infrastructure. This approach will minimize the potential for uncertainties in the conceptual site model to cause unnecessary disturbance (that is, avoid constructing unnecessary infrastructure). If the borehole data collected confirm the key assumptions used in the basis of design, the Category 1 monitoring well will be constructed consistent with the design detailed in Table 3.2-6 as a design basis						

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					and as appropriate based on the borehole data collected. A summary of the lithologic and water quality data collected will be communicated to the agencies via monthly progress reports as defined in Section 2 of this C/RAWP.						
950	DTSC-171	Design	Remedial design	3.2.1.4 Well Construction and Development East Ravine (ER) Extraction Wells. Page 3-23.	"Each of the wells will be constructed using up to a 6-inch-nominal-diameter conductor casing to the top of competent bedrock or a minimum of 20 feet bgs."	Large diameter conductor casings (e.g., 10 to 14 inches) should be considered to allow overdrilling in the future (to remedy fouling or increase yield/storage reservoir). This could negate drilling a new well. References of "up to" should be replaced with planned diameters. This also applies to similar uses throughout the document including the sentence following the cited sentence. The sentence also needs to be revised as, currently written, it can lead to improperly constructed conductors.	The primary reasons to implement this change would be if the actual well yield warrants a pump diameter larger than 4-inches in diameter, or if an alternative well design (e.g., nest well casings) was determined appropriate. While neither of these scenarios is included in the current design, implementing this change would decrease the likelihood that a well would need to be replaced should they ever be warranted. In accordance with the comment, the diameter of the conductor casing will be increased to 12-inch to allow for the potential to ream the bedrock borehole to a larger diameter at a future date, but the primary borehole/well casing will remain as currently designed. The referenced text will be revised as follows: "Each of the wells will be constructed using ~~up to~~ a ~~6~~12-inch-nominal-diameter conductor casing to the top of competent bedrock ~~or a minimum of 20 feet bgs~~."	Okay.			Comment resolved.

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							The initial borehole diameters will be added to the final design document. However, it is PG&E's opinion that the use of "up to" is appropriate elsewhere in this section as it preserves the flexibility to utilize smaller diameter boreholes and well casings as determined appropriate based on actual field conditions. In accordance with the EIR, PG&E will continuously work to identify opportunities to decrease the size and footprint of the remedy infrastructure, including wells. For example, If it is determined that the saturated thickness at a given southern IRZ well location only warrants one well screen as opposed to two, or a smaller well casing due to smaller in-well equipment, then the decision to down-size will be appropriate.				
951	DTSC-172	Design	Remedial design	3.2.1.4 Well Construction and Development East Ravine (ER) Extraction Wells. Well performance. Page 3-23.	"Following the development of a given well, the specific capacity will be compared to assumptions used in the design. Lower-than-predicted flow will not necessarily indicate that additional wells are required. Sustainable flow rates will be considered in the context of the conceptual site model, which will be continually updated as needed during remedy	The section should be rewritten to explain what will be done if lower-than-predicted flow is obtained from any given well. Tangible examples are requested. This comment applies to all other occurrences throughout the document.	The "Well Performance" bullet for this section will be revised as follows: "**Well performance.** Following the development of a given well, the specific capacity will be compared to assumptions used in the design. <u>Specifically, the combined extraction rates from each of the East Ravine extraction wells will be compared to total nominal flow rate of 5 gpm that was used in the design.</u> Lower-than-predicted flow <u>from a specific well</u> will not necessarily indicate that additional wells are required. Sustainable <u>average</u> flow rates <u>for the line of</u>	Okay.			Comment resolved.

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					implementation and used to assess the potential need to replace, deepen, or add wells to the East Ravine extraction well network."		extraction wells will be considered in the context of the conceptual site model, which will be continually updated as needed during remedy implementation and used to assess the potential need to replace, deepen, or add wells to the East Ravine extraction well network. For example, if the total average sustainable flow rate is only 4.5 gpm, then the model will be updated with the most current field data (using the update frequencies presented in Appendix B) to determine if this flow rate is expected to maintain the objectives of the extraction well line, or if wells are need to be replaced, deepened, or added. The application of geophysical logging, including borehole flow testing, might be appropriate to evaluate the hydrogeologic conditions within East Ravine extraction well(s) prior to deciding to replace, deepen, or add a well."				
952	FMIT/TRC 1o	Non-design	Request for Information	3.2.1.4 Well Construction and Development	EIR Well performance. Following the development of a given well, the specific injectivity will be compared to assumptions used in the design. Lower-than-predicted injection rates will not necessarily indicate that additional wells are required. Sustainable flow rates will be considered in the context	This is very vague and should be more specific so stakeholders can fully understand when additional wells are needed. In addition how will Tribes be involved in the review of the conceptual model updates and decisions regarding the need to replace or add new wells?	The "Well Performance" bullet for this section will be revised as follows: "**Well performance.** Following the development of a given well, the specific capacity will be compared to assumptions used in the design. Specifically, the injection rates from each of the IRL injection wells will be compared to the nominal flow rates that were used in the design. Lower-than-predicted flow at a specific well will not necessarily indicate that additional wells are required.			Please see response to comment FMIT/TRC RTC #44.	DTSC response: Tribal comment noted.

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					of the conceptual site model, which will be continually updated as needed during remedy implementation and used to assess the potential need to replace or add wells to the IRL injection well network.		Sustainable flow rates for each of the injection wells will be considered in the context of the conceptual site model, which will be continually updated as needed during remedy implementation and used to assess the potential need to replace or add wells to the IRL injection well network. For example, if the sustainable flow rate is less than that used in the design, then the model will be updated with the most current field data (using the update frequencies presented in Appendix B) to determine if this flow rate is expected to maintain the objectives of the given injection well in the context of the performance of the entire line of IRL injection wells. The decision to add wells will only be made after this analysis, which is based on well and aquifer testing data collected during construction, is performed." For model updates, please see RTC #76. For Tribal involvement in decisions regarding more wells (i.e., more than currently planned wells) please see RTCs #884-887. For communications with Tribes during construction and O&M generally, please see RTCs #44-47.				
953	Hualapai/TRC 1o	Non-design	Request for Information	3.2.1.4 Well Construction and Development	EIR Well performance. Following the development of a given well, the specific injectivity will be compared to	This is very vague and should be more specific so stakeholders can fully understand when additional wells are needed. In addition how will Tribes be involved in the review of the conceptual model updates and decisions regarding the need to replace or add new wells?	See above			See response to comment Hualapai/TRC RTC #83.	DTSC response: Tribal comment noted.

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					assumptions used in the design. Lower-than-predicted injection rates will not necessarily indicate that additional wells are required. Sustainable flow rates will be considered in the context of the conceptual site model, which will be continually updated as needed during remedy implementation and used to assess the potential need to replace or add wells to the IRL injection well network.						
954	Cocopah/TRC 1o	Non-design	Request for Information	3.2.1.4 Well Construction and Development	EIR Well performance. Following the development of a given well, the specific injectivity will be compared to assumptions used in the design. Lower-than-predicted injection rates will not necessarily indicate that additional wells are required. Sustainable flow rates will be considered in the context of the conceptual site model, which will be continually updated as needed during	This is very vague and should be more specific so stakeholders can fully understand when additional wells are needed. In addition how will Tribes be involved in the review of the conceptual model updates and decisions regarding the need to replace or add new wells?	See above			See response to Cocopah RTC #84.	DTSC response: Tribal comment noted.

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					remedy implementation and used to assess the potential need to replace or add wells to the IRL injection well network.						
955	Chemehuevi/ TRC 1o	Non-design	Request for Information	3.2.1.4 Well Construction and Development	EIR Well performance. Following the development of a given well, the specific injectivity will be compared to assumptions used in the design. Lower-than-predicted injection rates will not necessarily indicate that additional wells are required. Sustainable flow rates will be considered in the context of the conceptual site model, which will be continually updated as needed during remedy implementation and used to assess the potential need to replace or add wells to the IRL injection well network.	This is very vague and should be more specific so stakeholders can fully understand when additional wells are needed. In addition how will Tribes be involved in the review of the conceptual model updates and decisions regarding the need to replace or add new wells?	See above			See Chemehuevi/TRC RTC #85.	DTSC response: Tribal comment noted.
956	FMIT/TRC 1p	Non-design	Request for Information	3.2.1.4 Well Construction and Development	While the final location of FW-2 is subject to additional data collection, the location for FW- 1 is unlikely to change based on additional data from nearby wells.	It is stated that the location of FW-1 is unlikely to change. This however suggests that there is a possibility for well location change. Please indicate how the Tribes will be involved any future modifications to the remedy design post finalization of the BOD report.	Please see RTCs #44 FMIT/TRC, #45 Hualapai/TRC, #46 Cocopah/TRC, #47 Chemehuevi/TRC, #180 FMIT/TRC-1c, #181 Hualapai/TRC-1c, #182 Cocopah/TRC-1c, #183 Chemehuevi/TRC-1c, #201 FMIT/TRC-1d, #202 Hualapai/TRC-1d, #203 Cocopah/TRC-1d, #204			Please see response to comment FMIT/TRC RTC #44.	DTSC response: Tribal comment noted.

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Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							Chemehuevi/TRC-1d, #941 FMIT/TRC, #942 Hualapai/TRC, #943 Cocopah/TRC, and #944 Chemehuevi/TRC.				
957	Hualapai/TRC 1p	Non-design	Request for Information	3.2.1.4 Well Construction and Development	While the final location of FW-2 is subject to additional data collection, the location for FW- 1 is unlikely to change based on additional data from nearby wells.	It is stated that the location of FW-1 is unlikely to change. This however suggests that there is a possibility for well location change. Please indicate how the Tribes will be involved any future modifications to the remedy design post finalization of the BOD report.	See above			See response to comment Hualapai/TRC RTC #83.	DTSC response: Tribal comment noted.
958	Cocopah/TRC 1p	Non-design	Request for Information	3.2.1.4 Well Construction and Development	While the final location of FW-2 is subject to additional data collection, the location for FW- 1 is unlikely to change based on additional data from nearby wells.	It is stated that the location of FW-1 is unlikely to change. This however suggests that there is a possibility for well location change. Please indicate how the Tribes will be involved any future modifications to the remedy design post finalization of the BOD report.	See above			See response to Cocopah RTC #84.	DTSC response: Tribal comment noted.
959	Chemehuevi/ TRC 1p	Non-design	Request for Information	3.2.1.4 Well Construction and Development	While the final location of FW-2 is subject to additional data collection, the location for FW- 1 is unlikely to change based on additional data from nearby wells.	It is stated that the location of FW-1 is unlikely to change. This however suggests that there is a possibility for well location change. Please indicate how the Tribes will be involved any future modifications to the remedy design post finalization of the BOD report.	See above			See Chemehuevi/TRC RTC# 85.	DTSC response: Tribal comment noted.
960	FMIT/TRC 1q	Non-design	Request for Information	3.2.1.4 Well Construction and Development	Four provisional monitoring well locations (MW-V, MW-EE, and an area for two potential slant well locations) are identified in the 90% BOD Report; however, it is understood that the effectiveness of the monitoring network will be continuously assessed over the course of	Please indicate if the specific locations of these additional wells and boreholes have been presented within the BOD report. Also please indicate what level of involvement the Tribes will have in modifications that occur to the remedy design post finalization of the BOD reports.	The cited text from the 90% BOD is outdated. Locations for future provisional monitoring wells MW-V and MW-EE were identified after submittal of the 90% and are included in the Supplemental 90%. Slant monitoring wells in the Upland are no longer considered and are removed from the 90%. The assumed additional 10 monitoring wells is retained in the Supplemental 90% and their locations will be determined if needed to supplement the monitoring well network			The tribe reiterates the desire to be included in any discussions associated with proposed additional monitoring wells or new well locations. The use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape. PG&E should remain mindful of its independent legal	DTSC response: Tribal comment noted.

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					remediation and that additional wells will be installed, as needed. It is assumed that an additional 10 monitoring well locations, which might require multiple boreholes at each, could be required to supplement the monitoring well network during remedy operation as aquifer conditions change.		during remedy operation as aquifer conditions change. As previously mentioned, O&M information will be presented in quarterly progress reports to be submitted to the agencies and posted on a SharePoint site (or other venues) for access by Tribes and stakeholders. The need for and proposed locations for additional monitoring wells, if any, will be included the quarterly reports. The siting of additional wells, if needed, will be coordinated with the agencies, Tribes, and stakeholders.			obligations under the 2006 Settlement Agreement to consult with FMIT and to provide all non-attorney-client privileged material information, documentary or otherwise, to the Tribe contemporaneously with its receipt or development by PG&E.	
961	Hualapai/TRC 1q	Non-design	Request for Information	3.2.1.4 Well Construction and Development	Four provisional monitoring well locations (MW-V, MW-EE, and an area for two potential slant well locations) are identified in the 90% BOD Report; however, it is understood that the effectiveness of the monitoring network will be continuously assessed over the course of remediation and that additional wells will be installed, as needed. It is assumed that an additional 10 monitoring well locations, which might require multiple boreholes at each, could be required to supplement the	Please indicate if the specific locations of these additional wells and boreholes have been presented within the BOD report. Also please indicate what level of involvement the Tribes will have in modifications that occur to the remedy design post finalization of the BOD reports.	See above			Hualapai reiterates the need to be included (along with DOI and DTSC) as a primary party in communications regarding all project design changes, or work variance requests including material deviations from the design documents and/or C/RAWP due to discovery of changed site conditions as discussed in these earlier comments (at left). Communicating these changes needs to occur as soon as it is known that a change needs to be made. Hualapai needs to be included in those discussions via informing a tribal monitor, or email or telephone calls to designated points of contact. Access tp SharePoint sites are not always easy for Hualapai to access due to limited types of computer stations. Once the change has been approved then a	DTSC response: Tribal comment noted.

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					monitoring well network during remedy operation as aquifer conditions change.					formal document can be forwarded to Hualapai.	
962	Cocopah/TRC 1q	Non-design	Request for Information	3.2.1.4 Well Construction and Development	Four provisional monitoring well locations (MW-V, MW-EE, and an area for two potential slant well locations) are identified in the 90% BOD Report; however, it is understood that the effectiveness of the monitoring network will be continuously assessed over the course of remediation and that additional wells will be installed, as needed. It is assumed that an additional 10 monitoring well locations, which might require multiple boreholes at each, could be required to supplement the monitoring well network during remedy operation as aquifer conditions change.	Please indicate if the specific locations of these additional wells and boreholes have been presented within the BOD report. Also please indicate what level of involvement the Tribes will have in modifications that occur to the remedy design post finalization of the BOD reports.	See above			The tribes reiterate the desire to be included in any discussions associated with proposed additional monitoring wells or new well locations. The use of monthly progress reports and periodic uploads to SharePoint is not a sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape	DTSC response: Tribal comment noted.
963	Chemehuevi/ TRC 1q	Non-design	Request for Information	3.2.1.4 Well Construction and Development	Four provisional monitoring well locations (MW-V, MW-EE, and an area for two potential slant well locations) are identified in the 90% BOD	Please indicate if the specific locations of these additional wells and boreholes have been presented within the BOD report. Also please indicate what level of involvement the Tribes will have in modifications that occur to the remedy design post finalization of the BOD reports.	See above			The tribes reiterate the desire to be included in any discussions associated with proposed additional monitoring wells or new well locations. The use of monthly progress reports and periodic uploads to SharePoint is not a	DTSC response: Tribal comment noted.

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					Report; however, it is understood that the effectiveness of the monitoring network will be continuously assessed over the course of remediation and that additional wells will be installed, as needed. It is assumed that an additional 10 monitoring well locations, which might require multiple boreholes at each, could be required to supplement the monitoring well network during remedy operation as aquifer conditions change.					sufficient level of involvement when it comes to decisions that could result in permanent disturbance to the Sacred landscape	
964	FMIT/TRC	Non-design	Request for Information	C/RAWP 3.2.1.4 p. 3-25 Well Construction and Development	Four provisional monitoring well locations (MW-V, MW-EE, and an area for two potential slant well locations) are identified in the 90% BOD Report; however, it is understood that the effectiveness of the monitoring network will be continuously assessed over the course of remediation and that additional wells will be installed, as needed. It is assumed that an additional	Please indicate if the specific locations of these additional wells and boreholes have been presented within the BOD report.	Additional details/ specificities developed for select monitoring wells in the Upland subsequent to the submittal of the 90% design, supersede the first portion of the reference text cited in the comment. The subsequent design document (Supplemental 90%) showed the locations for the future provisional monitoring wells MW-V and MW-EE in Figure ES-4A, but did not propose slant monitoring wells in the Upland (see also RTCs #341-344). As indicated in the cited text, additional monitoring wells could be required to supplement the proposed monitoring well network. These			Noted.	

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					10 monitoring well locations, which might require multiple boreholes at each, could be required to supplement the monitoring well network during remedy operation as aquifer conditions change.		wells will be located after they are determined to be needed.				
965	Hualapai/TRC	Non-design	Request for Information	C/RAWP 3.2.1.4 p. 3-25 Well Construction and Development	Four provisional monitoring well locations (MW-V, MW-EE, and an area for two potential slant well locations) are identified in the 90% BOD Report; however, it is understood that the effectiveness of the monitoring network will be continuously assessed over the course of remediation and that additional wells will be installed, as needed. It is assumed that an additional 10 monitoring well locations, which might require multiple boreholes at each, could be required to supplement the monitoring well network during remedy operation as aquifer conditions change.	Please indicate if the specific locations of these additional wells and boreholes have been presented within the BOD report.	See above				
966	Cocopah/TRC	Non-design	Request for	C/RAWP	Four	Please indicate if the specific locations of these additional wells and boreholes have been	See above				

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			Information	3.2.1.4 p. 3-25 Well Construction and Development	provisional monitoring well locations (MW-V, MW-EE, and an area for two potential slant well locations) are identified in the 90% BOD Report; however, it is understood that the effectiveness of the monitoring network will be continuously assessed over the course of remediation and that additional wells will be installed, as needed. It is assumed that an additional 10 monitoring well locations, which might require multiple boreholes at each, could be required to supplement the monitoring well network during remedy operation as aquifer conditions change.	presented within the BOD report.					
967	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP 3.2.1.4 p. 3-25 Well Construction and Development	Four provisional monitoring well locations (MW-V, MW-EE, and an area for two potential slant well locations) are identified in the 90% BOD Report; however, it is understood that the effectiveness of the monitoring network will be	Please indicate if the specific locations of these additional wells and boreholes have been presented within the BOD report.	See above				

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					continuously assessed over the course of remediation and that additional wells will be installed, as needed. It is assumed that an additional 10 monitoring well locations, which might require multiple boreholes at each, could be required to supplement the monitoring well network during remedy operation as aquifer conditions change.						
968	DOI-151	Non-design	Process	3.2.1.4/3-26	A gyroscope survey will be conducted to verify that the well casing is plumb and straight, as determined necessary.	Since there are not too many options besides redrilling the borehole, if the well casing is not plumb – consider running the gyroscope down the sonic casing prior to setting the well.	Plumbness data collected from within the drill casing would be of very limited use since it would not directly correlate to the plumbness of the well casing itself. In general, a benefit of the casing advance methods that will be used for the majority of borehole drilling for well construction, including rotosonic, is that the boreholes are typically very straight compared to other methods (e.g., direct rotary, hollow-stem auger, etc.). In addition, the estimated maximum drilling depths for this project are relatively shallow (approximately 400 feet) and would not be expected to deviate significantly. More significant factors that could lead to well plumbness problems include defective well casing sections, uneven welded joints, or improper vertical		Resolved.		Comment resolved.

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							loading of the well casing during construction.				
969	DTSC-173	Design	Remedial design	3.2.1.4 Well Construction and Development Annular Seals. Page 3-27.	"Concrete. … and is typically reserved for large volume/diameter borehole or well decommissioning."	Concrete is not typically used as an annular seal in well construction and should be removed.	The following clarifying statement will be added to the end of the "Concrete" bullet: Concrete is typically only used in the shallowest portion of the borehole as a construction component of the wellhead protection.	Resolved.			Comment resolved.
970	DTSC-174	Design	Remedial design	3.2.1.4 Well Construction and Development Well Development. Page 3-28.	"The well will be considered developed (that is, ready for subsequent hydraulic testing and/or sample collection) when turbidity measurements are low and stable (typically 50 nephelometric turbidity units or less), specific capacity is stable, and the well is yielding groundwater that exhibits water quality measurements indicative of aquifer conditions as compared to the water used for drilling."	Revise to indicate that 5 to 10 NTUs is the goal for monitoring wells. Also add that a well will be considered developed after water has been removed during development that is greater in volume than any imported water added during well installation. Also add that all development activities will be documented and reported to agencies.	A target turbidity goal of 5 to 10 NTU is typically not practical for well development, but will be added to the groundwater sampling SOPs (for monitoring wells) as a target (O&M Manual Volume 2, SOP-A1, A2, A18); however, it is understood that this is not a hard criterion that must be met prior to sample collection. The referenced text will be modified as follows: "The well will be considered developed (that is, ready for subsequent hydraulic testing and/or sample collection) when turbidity measurements are low and stable (typically 50 nephelometric turbidity units or less), specific capacity is stable, <u>a minimum volume greater than the volume of any water introduced during drilling and well construction has been removed,</u> and the well is yielding groundwater that exhibits water quality measurements indicative of aquifer conditions as compared to the water used for drilling. The following text will be added to the end of Section 3.2.1.4 (well development subsection) of the	Okay.			Comment resolved.

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							C/RAWP: "Well development activities will be documented in accordance with the SOP and reported to the agencies via monthly progress reports as defined in Section 2 of the C/RAWP."				
971	DTSC-175	Design	Remedial design	3.2.1.5 Well Testing Page 3-29-30.		Revise the section to indicate that a series of slug tests will be conducted on new monitoring wells soon after well development to assess sufficient well development. As part of long term O&M, slug testing should be included as they can again be conducted periodically to see if significant changes have occurred from this baseline reading. Also refer the reader to the appropriate O&M section discussing well redevelopment standards.	This information will be collected following development of new monitoring wells by pumping the monitoring wells and assessing specific capacity. While Section 4.2.4 (Monitoring Well Acceptance) of the O&M Manual (Volume 1) addressed the collection of this data during routine sampling events, the collection of specific capacity data in monitoring wells will explicitly be added to the Baseline Assessment section of the O&M Manual. The following sentence will be added to the end of the third paragraph in Section 4.1.1.2 (baseline assessment of well performance, flow testing) of Volume 1 of the remedy O&M Manual: "An abbreviated version of baseline specific capacity testing will be conducted at all new monitoring wells. Monitoring wells, which are not designed for target extraction rates, will be pumped at one to three different rates following development such that specific capacity information can be compared to that collected during subsequent monitoring and/or re-development events (see Section 4.2.4). The use of slug test may also be appropriate to assess changes in well	Okay.			Comment resolved.

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							hydraulics over time. Consistent with this addition to the O&M Manual, the following text will be added to the end of the second paragraph of Section 3.2.1.5 of the C/RAWP: "An abbreviated version of baseline specific capacity testing will be conducted at all new monitoring wells. Monitoring wells, which are not designed for target extraction rates, will be pumped at one to three different rates following development such that specific capacity information can be compared to that collected during subsequent monitoring and/or re-development events (see Section 4.2.4 of the O&M Manual (Volume 1) regarding monitoring well acceptance standards. The use of slug test may also be appropriate to assess changes in well hydraulics over time."				
972	DOI-152	Non-design	Editorial	3.2.2/3-31		A bullet will need to be added for the alternative BCW crossing.	In response to 90% comments (see RTC #19 FMIT-5), the crossing design was changed to direct bury pipes/conduits in BCW. This new design would be covered under the "Direct Burial" bullet and therefore, a separate bullet is not necessary.		Resolved.		Comment resolved.
973	DOI-153	Non-design	Editorial	3.2.2/3-31	Bullets	It would be helpful to the reader to provide examples of where these types of pipeline configurations are anticipated, even if it is subject to change.	The following text will be added at the end of the following bullets in response to this comment: • **Direct burial**: For example, pipes/ conduits in the floodplain. • **Concrete trenches:** For example, pipes/ conduits along TCS entrance road. • **Trenchless**		Resolved.		Comment resolved.

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							technologies: <u>For example, segment of freshwater pipe under I-40</u>. • **Installed aboveground**: <u>For example, segment of freshwater pipe on the Arched Bridge</u>. • **Installed on pipe bridges**: <u>For example, segment of freshwater pipe on the Arched Bridge</u>.				
974	DOI-154	Non-design	Editorial	3.2.2.1/3-31	Similarly, any pavement will be segregated from the soil as required and managed.	Revise this sentence to note that pavement will be "transported offsite for recycling or disposal".	Text will be revised to read as follows: "Similarly, any pavement will be segregated from the soil as required and ~~managed~~ <u>transported offsite for recycling or disposal</u>."		Resolved.		Comment resolved.
975	DOI-155	Design	Remedial Design	3.2.2.1/3-31	The contractor(s) will select and implement the method used to prevent trench cave-ins and that selection will meet regulatory construction safety requirements.	DOI recognizes that the methodology for trench stabilization is based on site/soil conditions and engineering factors and that the contractor will have the ultimate decision on steps implemented to prevent collapse. However, given the sensitivity regarding excavation within the Topock cultural area, it is recommended that the preference for shoring over increased excavation be discussed within the design documents.	As presented in the 90% design, the majority of the trenches are shallow trenches (about 3 feet deep). With the exception of the floodplain, PG&E does not anticipate cave-ins to be an issue and most trenches will probably have near vertical walls based on soil type. Sloping or shoring may be required on the flood plain. PG&E will require and incentivize the construction contractors via contracting mechanism to limit excavation and not over-excavating. We found this method to be fairly effective without prescribing or restricting the means and methods for construction. The following text will be added (shown as <u>underline</u>): "The contractor(s) will select and implement the method used to prevent trench cave-ins and that selection will meet regulatory		Resolved.		Comment resolved.

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							construction safety requirements <u>as well as limiting excavation and not over-excavating</u>."				
976	FMIT/TRC	Non-design	Request for Information	C/RAWP p. 3-31 3.2.2.1 Direct Burial	Hand work, as well as soft dig methods, may also be required when trenching near existing underground utilities. Soft dig techniques include hydrovacuum excavation, and air lancing. With hydrovacuuming the soil is loosened by spraying the ground with high-pressure water. The loose soil and water is then vacuumed into a truck for transport and disposal.	The Tribes request that handwork as well as soft dig methods, be required when trenching near existing cultural resources. In addition please provide a detailed explanation of how protection will be ensured of unearthed cultural resources when soil loosening techniques such as spraying the ground with high-pressure water are used.	PG&E intends to use "soft dig" methodologies (primarily hydrovac) when the presence of underground utilities warrant the technique (mostly within the Topock Compressor Station and occasionally outside the station). Because the hydrovac system has a large footprint, it would not be suitable for use near identified cultural resources that need protection. For such resources, hand work or backhoe may be used. CIMP CUL-1a-8n protocols were developed for locations requiring specific protective devices, such as temporary fencing, flagging, or other type of demarcation during construction. According to the CIMP, protective measures may include, but are not limited to, protective coverings of soil or riprap, onsite personnel to prevent access to sensitive areas, use of flagging, blaze orange mesh fencing secured to steel posts, bollards, natural barriers of rocks or piled brush, cables suspended between secure posts, and/or signage (e.g., "This Area Closed" or "Exclusion Zone: Keep Out"). Any such measures will be temporary (only as needed during construction), and will, to the extent practicable, not call undue attention to the nature of the resource being protected. In the event that previously unidentified potentially			Noted.	

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							significant cultural resources are discovered during ground-disturbing activities, the Qualified Cultural Resources Consultant will have the authority to divert or temporarily halt ground-disturbing activities in the area of discovery to allow evaluation of the potentially significant cultural resources. See EIR mitigation measure CUL-1b/c-4 for additional details.				
977	Hualapai/TRC	Non-design	Request for Information	C/RAWP p. 3-31 3.2.2.1 Direct Burial	Hand work, as well as soft dig methods, may also be required when trenching near existing underground utilities. Soft dig techniques include hydrovacuum excavation, and air lancing. With hydrovacuuming the soil is loosened by spraying the ground with high-pressure water. The loose soil and water is then vacuumed into a truck for transport and disposal.	The Tribes request that handwork as well as soft dig methods, be required when trenching near existing cultural resources. In addition please provide a detailed explanation of how protection will be ensured of unearthed cultural resources when soil loosening techniques such as spraying the ground with high-pressure water are used.	See above			Noted.	
978	Cocopah/TRC	Non-design	Request for Information	C/RAWP p. 3-31 3.2.2.1 Direct Burial	Hand work, as well as soft dig methods, may also be required when trenching near existing underground utilities. Soft dig techniques include hydrovacuum excavation, and air lancing. With hydrovacuumin	The Tribes request that handwork as well as soft dig methods, be required when trenching near existing cultural resources. In addition please provide a detailed explanation of how protection will be ensured of unearthed cultural resources when soil loosening techniques such as spraying the ground with high-pressure water are used.	See above			Noted.	

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					g the soil is loosened by spraying the ground with high-pressure water. The loose soil and water is then vacuumed into a truck for transport and disposal.						
979	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP p. 3-31 3.2.2.1 Direct Burial	Hand work, as well as soft dig methods, may also be required when trenching near existing underground utilities. Soft dig techniques include hydrovacuum excavation, and air lancing. With hydrovacuumin g the soil is loosened by spraying the ground with high-pressure water. The loose soil and water is then vacuumed into a truck for transport and disposal.	The Tribes request that handwork as well as soft dig methods, be required when trenching near existing cultural resources. In addition please provide a detailed explanation of how protection will be ensured of unearthed cultural resources when soil loosening techniques such as spraying the ground with high-pressure water are used.	See above			Noted.	
980	DOI-187	Non-design	Editorial	Figure 3.2-1	Highlighting	The figure legend should define the significance of the highlighting and should cross reference back to Section 3.2.1.3 for more details.	The additional information requested will be added to the figure legend.		Accepted		Comment resolved pending DOI review of the final design documents.
981	FMIT/TRC	Design	Remedial Design	C/RAWP Fig. 3.2-1	Estimated Approach to Well Network Construction	Category 1 needs to include MW-L, MW-M, and MW-N in order to better define the boundaries of the plume.	Based on the review of existing groundwater monitoring data, the following monitoring well locations will be reclassified as Category 1 well locations: MW-L, M, R, U, and Z. These locations will be added to Table 3.2-6 and Exhibit 3.3-2 (Key Well Schedule Constraints) and the following text will be added to the introductory paragraph of the Category 1 portion of Section			Considering the changes in construction scheduling (per TWG Handout 082715) where different phases of the construction sequencing were described, it is requested that wells in culturally sensitive areas of the upland (e.g. MW's AA, BB, CC, DD, EE, FF, GG, I, J, P, and V) should be installed as late as possible as part of phase 2.	Comment resolved pending verification of the procedure within 100% design.

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							3.2.1.3: "**Approach to Category 1 Locations.** Category 1 wells have been designated in areas where existing uncertainties in the current conceptual site model may drive final well siting and/or design, as well as the other associated remedy infrastructure (pipelines). These areas include the northern area of the NTH IRZ, the IRL injection area in the uplands, the southern freshwater injection well (FW-2) area, and the East Ravine area. In each of these areas, an already planned monitoring well<u>(s)</u> ~~has~~ <u>have</u> been designated as ~~the~~ Category 1 well location<u>(s)</u>. Data collection at these locations will be scheduled early in the construction schedule to confirm the assumptions in the basis of design for these areas prior to moving forward with the construction of other wells and remedy infrastructure. <u>In the Upland, where multiple Category 1 locations are planned, an "east to west" approach to Category 1 well installation will generally be applied (see Exhibit 3.3-2 for more detail).</u> This approach will minimize the potential for uncertainties in the conceptual site model to cause unnecessary disturbance (that is, avoid constructing unnecessary infrastructure)." Based on review of existing groundwater monitoring data it is PG&E's opinion is that MW-N will be within the			Comment resolved pending verification of the procedure within 100% design.	

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Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							plume and that data from this location will not be used to confirm the locations of other remedy infrastructure (particularly to the west); therefore, MW-N will remain classified as a Category 3 location.				
982	Hualapai/TRC	Design	Remedial Design	C/RAWP Fig. 3.2-1	Estimated Approach to Well Network Construction	Category 1 needs to include MW-L, MW-M, and MW-N in order to better define the boundaries of the plume.	See above			Considering the changes in construction scheduling (per TWG Handout 082715) where different phases of the construction sequencing were described, it is requested that wells in culturally sensitive areas of the upland (e.g. MW's AA, BB, CC, DD, EE, FF, GG, I, J, P, and V) should be installed as late as possible as part of phase 2. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
983	Cocopah/TRC	Design	Remedial Design	C/RAWP Fig. 3.2-1	Estimated Approach to Well Network Construction	Category 1 needs to include MW-L, MW-M, and MW-N in order to better define the boundaries of the plume.	See above			Considering the changes in construction scheduling (per TWG Handout 082715) where different phases of the construction sequencing were described, it is requested that wells in culturally sensitive areas of the upland (e.g. MW's AA, BB, CC, DD, EE, FF, GG, I, J, P, and V) should be installed as late as possible as part of phase 2. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
984	Chemehuevi/ TRC	Design	Remedial Design	C/RAWP Fig. 3.2-1	Estimated Approach to Well Network Construction	Category 1 needs to include MW-L, MW-M, and MW-N in order to better define the boundaries of the plume.	See above			Considering the changes in construction scheduling (per TWG Handout 082715) where different phases of the construction sequencing were described, it is requested that wells in culturally sensitive	Comment resolved pending verification of the procedure within 100% design.

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
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										areas of the upland (e.g. MW's AA, BB, CC, DD, EE, FF, GG, I, J, P, and V) should be installed as late as possible as part of phase 2. Comment resolved pending verification of the procedure within 100% design.	
985	DOI-156	Design	Remedial Design	3.2.2.1/3-32	An alternative to stabilization is to redesign the pipe.	Further discussion on the purported redesign of the pipe should be provided.	Any redesign of piping required due to the referenced text would not be known until construction is underway. At that time any required redesign will be completed in accordance with the established field change procedures.		Resolved.		Comment resolved.
986	DOI-157	Non-design	Editorial	3.2.2.1/3-33	A material haling vehicle would then move into the space vacated by the spoil-hauling vehicle. After competing installation, the excavation equipment could then forward along the pipe alignment	Replace "haling" with "hauling". Replace "competing" with "completing". Add "move" after "then".	Revision will be made as requested.		Resolved.		Comment resolved.
987	FMIT/TRC	Non-design	Request for Information	C/RAWP 3.2.2.2 p. 3-24 Concrete Trench	Install Concrete Trenches. Box-like sections of concrete trench will be placed into the excavation using construction equipment.	Please indicate what dictates the use of a concrete trench box versus simple trenching? Also what level of detail has been provided regarding the exact locations where trench boxes will be placed?	The selection of concrete trench or direct buried (traditional) trenching is specified in Section C.2.2 (page C-5) of Appendix C. The locations of the trench boxes are depicted in the Appendix D design drawings.			Noted.	
988	Hualapai/TRC	Non-design	Request for Information	C/RAWP 3.2.2.2 p. 3-24 Concrete Trench	Install Concrete Trenches. Box-like sections of concrete trench will be placed into the excavation	Please indicate what dictates the use of a concrete trench box versus simple trenching? Also what level of detail has been provided regarding the exact locations where trench boxes will be placed?	See above			Noted.	

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					using construction equipment.						
989	Cocopah/TRC	Non-design	Request for Information	C/RAWP 3.2.2.2 p. 3-24 Concrete Trench	Install Concrete Trenches. Box-like sections of concrete trench will be placed into the excavation using construction equipment.	Please indicate what dictates the use of a concrete trench box versus simple trenching? Also what level of detail has been provided regarding the exact locations where trench boxes will be placed?	See above			Noted.	
990	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP 3.2.2.2 p. 3-24 Concrete Trench	Install Concrete Trenches. Box-like sections of concrete trench will be placed into the excavation using construction equipment.	Please indicate what dictates the use of a concrete trench box versus simple trenching? Also what level of detail has been provided regarding the exact locations where trench boxes will be placed?	See above			Noted.	
991	DOI-158	Non-design	Editorial	3.2.3/3-43	Excavation in hard soil or rock may require special excavation techniques such as road mining, grinding, and/or hoe-ramming.	Is the technique noted as “road mining” meant to be “road milling”?	No. We did not use the term “road milling” because it could be mistaken for an operation where relatively thin layers of existing pavement are ground from a road surface. Here, the term “road mining” was used to mean a deeper and bulk rock grinding operation using surface mining equipment.		Resolved.		Comment resolved.
992	DOI-159	Design	Remedial design	3.2.4.2/3-46, 2nd ¶	Typically, there will be at least one way to access each well, but there will not be a dedicated route to each well.	The implication here is that multiple access routes to wells may be considered. Given the biological and cultural constraints in the area, a single access route to a well is preferred.	The design is configured so that there is one access route to each well. However, by chance there will be more than one way to access select wells. For example, wells in the flood plain can be accessed from the ring road by driving clockwise around the ring road or counterclockwise around the ring road.		Resolved.		Comment resolved.
993	DOI-160	Non-design	Other	3.2.6/3-46, 3rd ¶	Improvements will be made to the road that leads into Bat Cave Wash from the west (to the west of TCS).	It is unclear from the description if the referenced road leads from the TCS to BCW or if it is the E-W pipeline road across from BCW. If it is the latter, further discussion regarding the specified improvements must occur considering the proximity to the Topock Maze.	The referenced road is the steep and heavily eroded portion of the access road leading into Bat Cave Wash and to well FW-2 from the west. Refer to drawings C-07-201 and C-07-202.		Resolved.		Comment resolved.
994	DOI-161	Design	Remedial	3.2.4.2/3-46,	Details are	It is presumed that this information will be provided in the supplemental design.	PG&E notes that the		Resolved.		Comment resolved.

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			design	3rd ¶	being developed and will be presented to agencies and stakeholders shortly after submittal of the 90% design.		cited text is in Section 3.2.6, and not Section 3.2.4.2. The details referenced in the cited text were developed and included in the Supplemental 90%.				
995	DOI-162	Non-design	Process	3.3/3-48	A more detailed construction schedule will be prepared following approval of the 100% design and selection of contractors.	The detailed construction schedule should identify important project points along the critical path for construction activities, as well as dates or frequency of inspections/audits or other planned quality activities. The accompanying discussion should identify any potential resource and/or time constraints at these points, if applicable, and mitigation of these constraints.	A detailed construction schedule will be prepared following approval of the final design and selection of construction contractors. In addition, as discussed in RTCs #72-75, PG&E will submit additional details on the construction and start-up sequence in anticipation of construction activity in 2016, during the 90% RTC period (see **Attachment D** of the final RTC table). This sequencing plan provides for start-up of system elements while construction proceeds. This approach will provide more time for data analysis and adaptive design changes while still completing the overall program within the originally planned schedule. Specifically the sequencing will allow time to assess and accommodate, as appropriate, changes to the remedial system footprint; including the number and location of the Uplands IW, MWs and the associated pipeline alignment, and the Riverbank wells, in coordination with tribal stakeholders and agencies.		Resolved.		Comment resolved.
996	FMIT/TRC	Non-design	Request for Information	C/RAWP 3.3.1.3 p. 3-49 Overall Project Starting Conditions	This construction sequence shown in the preliminary	Please provide a schedule of when this EIR will be drafted and reviewed.		A preliminary schedule for the Supplemental EIR was presented at the July 22, 2015		Noted.	

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					construction schedule starts when the groundwater remedy design is ready to construct. For purposes of sequencing, the design is considered ready to construct when the activities listed below are completed: DTSC's environmental review (EIR) on the design is complete.			CWG meeting.			
997	Hualapai/TRC	Non-design	Request for Information	C/RAWP 3.3.1.3 p. 3-49 Overall Project Starting Conditions	This construction sequence shown in the preliminary construction schedule starts when the groundwater remedy design is ready to construct. For purposes of sequencing, the design is considered ready to construct when the activities listed below are completed: DTSC's environmental review (EIR) on the design is complete.	Please provide a schedule of when this EIR will be drafted and reviewed.		See above		Noted.	
998	Cocopah/TRC	Non-design	Request for Information	C/RAWP 3.3.1.3 p. 3-49 Overall Project Starting Conditions	This construction sequence shown in the preliminary construction schedule starts when the groundwater remedy design is ready to construct. For purposes of sequencing, the design is	Please provide a schedule of when this EIR will be drafted and reviewed.		See above		Noted.	

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					considered ready to construct when the activities listed below are completed: DTSC's environmental review (EIR) on the design is complete.						
999	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP 3.3.1.3 p. 3-49 Overall Project Starting Conditions	This construction sequence shown in the preliminary construction schedule starts when the groundwater remedy design is ready to construct. For purposes of sequencing, the design is considered ready to construct when the activities listed below are completed: DTSC's environmental review (EIR) on the design is complete.	Please provide a schedule of when this EIR will be drafted and reviewed.		See above		Noted.	
1000	DOI-163	Non-design	Legal	Exhibit 3.3.1/3-50	Preliminary Construction Schedule	In accordance with the Consent Decree, the projects schedule should identify the anticipated date for submittal of the Construction Completion Report.	Exhibit 3.3.1 will be revised to note that the line item TC.CC shown in the schedule graphic includes preparation and submittal of the Construction Completion Report, and the Construction Completion Report will be explicitly mentioned in Section 3.2.6 and Section 3.3.6.		Accepted.		Comment resolved pending DOI review of the final design documents.
1001	DOI-164	Non-design	Editorial	3.3.3.3/3-51	Some wells require installation of the respective pipeline to provide access to the well and for management of water generated during well development	Do you mean the road to install the pipeline must be installed to access the well location? Please clarify. Also, according to Exhibit 3.3-1, most of the wells are installed before completion of the remedy produced water conditioning plant. Please clarify how the existence of the pipeline allows management of generated water.	Yes, in some cases the road needed to install the pipeline will also be needed for well drilling equipment to access the well location. As a result, the road and associated pipeline will be constructed before drilling the well in select locations (for example, Pipeline H and Well IRL-4).		Resolved.		Comment resolved.

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					and testing.		In some cases (e.g., wells on the flood plain), the pipeline installed prior to well drilling may be used to convey water associated with well drilling, development, and testing. This could reduce the need to transport water to/from the well site with a water truck.				
1002	DOI-165	Non-design	Process	3.3.3/3-52	Exhibit 3.3-2. Further, advance construction of the pipelines will provide for the ability to convey water generated during well construction, development, and testing; thus limiting the associated equipment footprint.	It seems the logistics of transporting drill cuttings and well development water to a remote location is impractical. Finding a suitable remote location may also be difficult. Please provide an example of this scenario.	Pipeline H may be used to convey water associated with the construction, development, and testing of well IRL-4. Similarly, wells on the flood plain, which can be difficult to access, could be constructed with less footprint (i.e., traffic to the work areas) if pre-constructed pipelines were utilized. Also refer to response to comment DOI-164.		Resolved.		Comment resolved.
1003	DOI-166	Design	Infrastructures	3.3.3/3-52	Exhibit 3.3-2. Temporary IM-3 injection piping may be constructed before IRL-3 and FW-1 so the drilling work does not interfere with IM-3 injection activities.	This statement implies that the current IM-3 injection piping will be removed to access IRL-3 and FW-1. Please provide additional clarifying text as to how this piping interferes with access and what the anticipated configuration is for temporary piping. For example, is the underground piping in the vicinity of IW-2 and IW-3 to be removed and replace with temporary above ground piping?	The existing IM-3 injection piping will be in proximity to Pipeline B and likely interfere with construction. The existing piping lies on the ground surface on the north side of the IM-3 access road (DWGs C-07-20 and -21) and the edge of the Pipeline B trench will be very close to the IM-3 piping. The existing pipeline also runs directly through the planned work areas for multiple planned well locations including FW-1, IRL-3, MW-BB, and MW-CC. It is possible that the injection piping may fall into the trench or be struck by construction equipment. This piping must remain in service to allow continued operation of IM-3. The construction contractor is required to protect the piping in-place but they may also install temporary		Resolved.		Comment resolved.

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							"jumper" pipes so that the piping may be temporarily shifted during construction. C/RAWP 4.1.2 contains additional clarifying text. Temporary jumper used for construction are typically designed, installed, and maintained by the construction contractor and not shown on design drawings. It is likely that the jumper pipes will only be used to provide service for above-ground portions of the existing piping between (STA 14+00 and STA 27+50 on DWGs C-07-20 and -21, respectively).				
1004	DOI-167	Non-design	Editorial	3.3.3/3-52	Exhibit 3.3-2. Once the FW-2 location is confirmed, the access road will be constructed before installing FW-2, MW-S, MW-HH, and MW-II.	The sentence previous to this statement indicates MW-S is initially installed to locate FW-2. Please clarify.	The cited sentence will be revised as follows: "Once the FW-2 location is confirmed, the access road will be constructed before installing FW-2, ~~MW-S,~~ MW-HH, and MW-II"		Resolved.		Comment resolved.
1005	DOI-168	Non-design	Other	3.3.4/3-53	Construction of several pipelines could begin soon after completion of the relevant preconstruction activities. As shown on Exhibit 3.3-1, this includes Pipelines A, B, C, I, and E.	Please provide a figure in this section identifying the locations of all pipelines.	See NEW Figure 3.3-1 included in **Attachment V** of the final RTC table.		Resolved.		Comment resolved.
1006	DOI-169	Non-design	Editorial	3.3.4/3-53	Exhibit 3.3-3.	In general, additional explanation of how installation of monitoring wells and certain pipelines constrain the timing of installation of other pipelines is needed throughout this exhibit. Examples are noted below.	See responses below.		Resolved.		Comment resolved.
1007	DOI-170	Non-design	Infrastructures	3.3.4/3-53	For example, Pipeline G cannot start construction until a portion of Pipeline C has been constructed in the floodplain.	Please provide additional explanation of how Pipeline C constrains the timing of installing Pipeline G. Are you saying the tie in "T" on Pipeline C has to be installed before Pipeline G can be properly located?	The construction of the northern and southern portions of Pipeline C near the pipeline G connections will create the road needed for personnel and equipment to access the pipeline G construction area (refer also to Pipeline G portion of		Resolved.		Comment resolved.

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							Exhibit 3.3-3). In addition, Pipeline C may be used to convey water used for leak testing Pipeline G and nearby wells.				
1008	DOI-171	Non-design	Infrastructures	3.3.4/3-53	Exhibit 3.3-3. Construction of Pipeline C in the IRZ North/River Bank area may begin after completion of monitoring well MW-A.	Please provide additional explanation of how installation of monitoring well MW-A constrains the timing of installing Pipeline C. What are you expecting to learn from installation of MW-A that influences the installation of Pipeline C. Would IRZ-1 and IRZ-2 not be installed?	As indicated on Table 3.2-6 of the C/RAWP, the construction of MW-A is intended to confirm the assumption that the northern margin of the groundwater plume is defined and the northern extent of the NTH IRZ and River Bank extraction wells are adequate. Planned well IRZ-1 and future provisional well IRZ-2 are sited based on this assumption holding true, but data collected from MW-A (primarily in the deeper portion of the unconsolidated aquifer) might indicate that additional IRZ wells are needed to the north; therefore, it would be prudent to construct Pipeline C after it is confirmed that the northern margin of the groundwater plume is defined.		Resolved.		Comment resolved.
1009	DOI-172	Non-design	Infrastructures	3.3.4/3-53	Exhibit 3.3-3. Construction of Pipeline C in the East Ravine area may begin after completion of monitoring well MW-70BR-D.	It appears this statement refers to pipeline C-18. Please revise. Also, please provide additional explanation of how installation of well MW-70BR-D constrains the timing of installing Pipeline C-18. What are you expecting to learn from installation of MW-70BR-D that influences the installation of Pipeline C-18. Please clarify.	The statement refers primarily to the portion of Pipeline C along the river bank that will serve the East Ravine extraction wells. As indicated on Table 3.2-6 of the C/RAWP, the construction of MW-70BR-D is intended to confirm the assumption that the East Ravine extraction wells will function properly at the designed total depth (i.e., confirm that concentrations decrease with depth at this location). While this information is not expected to change the siting of the wells, it could affect the well design (i.e., depth). Therefore, the extraction wells would		Resolved.		Comment resolved.

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							not be drilled and constructed until the designed depth is confirmed, and it would follow that that pipeline may not be constructed until the wells were constructed. Pipeline C-18 will be plumbed to existing well MW-70BR-200 and this pipeline might also be useful for conveying water associated with the construction of MW-70BR-D into/out of the East Ravine without the use of a water truck (see also responses to comments DOI-164 and DOI-165).				
1010	DOI-173	Non-design	Infrastructures	3.3.5/3-55	Exhibit 3.3-4. Cannot start until TWB-02 well installed….	It is not clear why construction cannot start on the TW Bench until well TWB-02 is installed. The well is not within the TW bench footprint. Please clarify.	TWB-02 is located within the TW bench footprint (see C/RAWP Figures 3.1-1 and 3.2-1, and BOD Appendix D Drawing C-08-04). Construction of the TW Bench facilities before drilling TWB-02 would likely limit access to and constrain space at the drilling site. With the TW Bench being a heavily trafficked and constrained work area even before the addition of remedy facilities, the TW Bench facilities well construction will be made easier, safer, and less expensive to install by sequencing the construction of other constraining facilities them after drilling well TWB-02.		Resolved.		Comment resolved.
Specific Comments – Construction/Remedial Action Work Plan, Section 4: Site Management Plan											
1011	DOI-174	Non-design	Process	4.1.3/4-3	Soil investigation activities are expected to include drilling and soil sampling, potential plant or other biota sampling, pilot testing, equipment staging and decontaminati	The soil investigation does not currently include pilot testing. It may be assumed that this would be considered after the investigation is complete and remedial alternatives are being considered, if necessary. Delete the reference to pilot testing.	Reference to pilot testing has been deleted from the text. The sentence will be revised as follows: "Soil investigation activities are expected to include drilling and soil sampling, potential plant or other biota sampling, ~~pilot testing,~~ equipment staging and decontamination, and investigation-derived		Resolved.		Comment resolved.

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					on, and investigation-derived waste management.		waste management."				
1012	DOI-175	Non-design	Infrastructures	4.2.3/4-7	The location of access routes and staging areas are depicted on Figure 4.2-3.	On Figure 4.2-3, please demark new remedy access routes that require construction of a road (e.g., grading, adding bedding, etc.). Also, please identify the location of County Highway 10 on the figure. Please identify the purpose of the road to the north of the NTH. Lastly, why is there a new remedy access road down to the Topock Marina? The access to the well should be an existing road.	Additional details will be added to Figure 4.2-3 as requested (A revised Figure 4.2-3 will be prepared for review during the 90% RTC period and included in **Attachment W** of the final RTC table). The spur road north of the NTH is not currently used nor planned for remedy use. It will be removed from Figure 4.2-3. The same change will apply to Figure 3.5-9A in the BOD. The access road to the well in Topock Marina is an existing road. Color will be changed from green to purple.		accepted		Comment resolved pending DOI review of the final design documents.
1013	DTSC-176	Design	Remedial Design	4.2.5 Construction Water Supply Page 4-8.	"Treated water from IM-3. Excess treated water from IM-3 will be accessed by the existing IM-3 storage and distribution system, or utilizing a temporary storage and supply system."	It is not certain if utilizing treated IM-3 water for construction water supply is appropriate. The text should discuss limitation associated with the elevated TDS of the treated water (approximately 4,500 mg/L). Can it adversely impact plants or threaten the shallow aquifer? Concurrence from the Water Board is also suggested.	Excess treated water from IM-3 is one of several options identified for construction supply water (see Section 4.2.5 of C/RAWP). PG&E will obtain concurrence from the Water Board and DOI prior to using IM-3 treated water for dust suppression during remedy construction in areas within the Uplands. Having access to a local source of water would reduce construction truck traffic and congestion to/from the Uplands. Most construction areas in the Uplands are limited to the access road and previously disturbed areas, with very minimal vegetation. Biological clearance (including vegetation) will be obtained prior to the start of construction. It is anticipated that protective measures for sensitive plants that may occur near construction	Text in the design document should discuss potential limitations associated with the elevated TDS of the treated water. In addition to potential impact of TDS to the shallow aquifer, repeated applications when used as construction water supply could raise total salt build up in soil. This could limit potential restoration and reuse of the soil in the future (e.g., affect future vegetation planting) Best management practice may be to inject the saltier waters to the deeper, saltier, portions of the aquifer. Again, the text should discuss limitations and any needed action(s).			Without further evaluation by PG&E of impacts from TDS, this use should be removed from the remedy as an option for disposing treated IM-3 water. PG&E Response: PG&E understands the agency's concern, and will conduct further evaluation of potential TDS impacts associated with the use of IM 3 treated water for dust suppression during remedy construction. The evaluation will be submitted to DTSC for CEQA evaluation. If useful, this language can be added to the CRAWP.

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							areas (e.g., demarcate plants as being outside of allowed work areas) would preclude those plants from being sprayed with dust suppression water or being watered with runoff, if any, from dust suppression water.	Without proper consideration by PG&E of impacts, this use should be removed from the remedy as an option for disposing treated IM-3 water.			
1014	DOI-176	Non-design	Process	4.3.1/4-10	Should a designated inspector observe disturbance to the environment, notification will be provided to DTSC and the corresponding landowner.	Should a “disturbance to the environment” occur, PG&E shall also notify DOI and BLM.	Text will be revised to read: “Should a designated inspector observe disturbance to the environment, notification will be provided to DTSC, DOI, and the corresponding landowner/ land manager.” Text will also be revised in the Site Security Plan consistent with RTC #905 DOI-145.		Resolved.		Comment resolved.
1015	DOI-177	Non-design	Editorial	4.3.2/4-11	Consistent with EIR Mitigation Measure CUL-1a-8l, as formulated in Section 2.12 of the CIMP, Protocols for Tribal Monitors to Observe Ground Disturbing Activities; and in the sections “Tribal and Archaeological Monitoring Protocol” in the PA and CHPMP, PG&E will notify the Interested Tribes of planned ground-disturbing activities and other scientific surveying being conducted in anticipation of construction activities.	The Tribal and Archaeological Monitoring Protocol does not refer to “Interested Tribes” but rather the Tribes. Delete the word “interested”.	The word “interested” will be deleted.		Resolved.		Comment resolved.
1016	JDS-5	Non-design	Monitoring	Section 4.3.2	Protocols for Visitors and Monitors Last Paragraph	With regard to prohibiting monitors from exclusion zones in primary work areas, the text should indicate that monitors would be generally allowed except under exceptional conditions. The provision for alternative methods for accommodating monitors should indicate that this is not the typical method of observation.	Safety is of paramount importance around working heavy equipment and exclusion zones are always established to			Requires further discussion as to circumstances under which access by TMs might be granted.	DTSC/DOI response: PG&E will comply with Protocol for TM to observe ground disturbing activities. Tribes can request

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							keep all but necessary personnel safely out. Monitoring locations will be established as close as possible to all work as guided by the CUL-1a-8l protocol.				additional access on a case by case bases if needed.
1017	JDS-6	Non-design	Monitoring	Section 4.3.2	Protocols for Visitors and Monitors	Tribal Monitors report to PG&E, available to tribes on request. Change to be copied to tribes.	When provided to PG&E, Tribal monitor's daily reports can be copied and given back to the monitor for distribution as determined by their tribe.			Noted.	
1018	DOI-178	Non-design	Other	4.3.3/4-12		This section should emphasize the need to minimize the effects of the project on Park Moabi residents, their recreational activities, and their safety.	The following text will be added to Section 4.3.3 to address this comment (underline; for text addition): "After check in, arrangements will be made for meeting the specific contact person for the specific load at the designated work area. To control onsite traffic and minimize disruptions to existing operations (including but not limited to operations at Moabi Regional Park, operations by property owners/land managers/utility companies/BNSF Railroad, and operations related to IM-3) and activities (by Moabi Regional Park residents and/or recreational users of the area) — depending on the quantity and type of equipment/materials—designated onsite trucks may be used to shuttle materials from the check-in point to individual staging areas/ construction zones. This approach of using designated vehicles may also apply to transporting personnel to and from the construction zones. Personnel vehicles will typically be parked at the CHQ."		Resolved.		Comment resolved.
1019	DOI-179	Non-design	Editorial	4.4.2/4-13	Air and	Please provide Exhibit 4.4-1. It is missing from the document.	Exhibit 4.4-1 is a typo,		Resolved.		Comment resolved.

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					meteorological monitoring will be performed for construction activities within the boundaries of soil investigation areas that overlap with or are located within 20 feet of groundwater remedy infrastructure, as identified in Exhibit 4.4-1.		and will be revised to refer to Exhibit 4.1-1 (Soil RFI/RI SWMUs, AOCs, and Undesignated Areas).				
1020	DOI-180	Non-design	Editorial	4.4.3/4-13	Where a designated decontamination pad is not available and/or not conveniently located, a temporary equipment decontamination facility will be constructed to properly decontaminate equipment by mechanical means as well as with the use of high pressure, low-volume hot water when necessary.	At which primary work zones and/or under what conditions would high pressure, low-volume hot water be necessary? Please clarify.	Decontamination using high pressure, low volume hot water may be used, in combination with using wire or stiff brushes, to dislodge dirt that is attached to heavy equipment (e.g., drilling rigs, drilling rods/tools, and backhoe). This method could be used in any primary work zones when necessary to effectively decontaminate equipment between locations and to prevent tracking of muds or dirt out of primary work zones and onto public or private roads.		Resolved.		Comment resolved.
1021	DOI-181	Non-design	Editorial	4.5.1		All waste streams are found under the subsection Wastewater. This section should be divided into additional waste categories.	The section will be subdivided into Wastewater, Displaced Site Material, General Construction Waste, and Other Waste.		Accepted.		Comment resolved pending DOI review of the final design documents.
1022	DOI-182	Design	Process	4.5.1.1/4-15	It is expected that some of this wastewater stream will be conveyed to temporary staging areas (for example, the MW-20 Bench) and subsequently disposed onsite at the existing	What would be an appropriate well that could receive untreated groundwater? Please clarify.	The reference to injection into an appropriate well pertains only to injection of well testing/sampling water (no chemical additives will be used during well testing activities) consistent with the requirements of the California State Water Resources Control Board Water Quality Order No. 2003-0003-		Resolved.		Comment resolved.

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					IM-3 treatment plant and TCS evaporation ponds or injected into an appropriate well subject to availability and in accordance with the substantive requirements.		DWQ. The cited text will be clarified to read as follows: "**Wastewater generated from well installation, development, and testing/sampling**. The current estimated total volume of wastewater generated over the entire construction period is 25 million gallons. It is expected that some of this wastewater stream will be conveyed to temporary staging areas (for example, the MW-20 Bench) and subsequently disposed onsite at the existing IM-3 treatment plant and TCS evaporation ponds. In addition, water from well testing/sampling ~~or~~ will be injected into an appropriate well (through a filter to remove particulate matter) of similar aquifer water quality subject to availability and in accordance with the substantive requirements. Excess or hazardous wastewater will be transported offsite for treatment/disposal.				
1023	DTSC-177	Design	Remedial design	4.5.1.1 Wastewater Page 4-15.	"**• Wastewater generated from well installation, development, and testing/ sampling.** The current estimated total volume of wastewater generated over the entire construction period is 25 million gallons. It is expected that some of this wastewater	Waste water injection into onsite injection wells will require periodic monitoring of those waste constituents injected into the aquifer. For clarity, the "appropriate well" should be defined / referenced as should the "substantive requirements" cited.	See RTC #1022 DOI-182.		Resolved.		Comment resolved.

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					stream will be conveyed to temporary staging areas (for example, the MW-20 Bench) and subsequently disposed onsite at the existing IM-3 treatment plant and TCS evaporation ponds or injected into an appropriate well subject to availability and in accordance with the substantive requirements. Excess or hazardous wastewater will be transported offsite for treatment/disposal. • **Remedy-produced water generated during remedy startup such as backwashing of wells.** This wastewater stream will be transported onsite via piping or trucking to the remedy-produced water conditioning plant (inside the TCS), conditioned by removing solids and pH adjustment, and transported via piping to the IRZ wells for re-injection….”						
1024	FMIT/TRC	Non-design	Request for Information	C/RAWP 4.6.2.1 p. 4-21	Curtail or reduce	Please provide rationale for the 25 mph limit. When the soil is dry, it doesn't take much to get them moving; the threshold wind velocity only needs to be at about 9 miles per hour (14.5 kilometers per	The 25 mph limit is per the EIR mitigation	DTSC believes the second part of the		The Tribe agrees with DTSCs response and	DTSC response: Tribal comment

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				Dust Control	nonessential earth moving activity under high-wind conditions (greater than 25 miles per hour), or develop a plan to control dust during high-wind conditions.	hour) to disrupt the surface. It is suggested that the limit be reduced to 15 mph or rationale be provided on why 25 mph is appropriate and will not result in localized increases in suspended particles.	measure AIR-1e which states: "e) Curtail nonessential earth-moving activity under high wind conditions (greater than 25 miles per hour) or develop a plan to control dust during high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces due to wind erosion shall be considered sufficient to maintain compliance." Mojave County Air Quality Management District (MAQMD) guidance for "Fugitive Dust Control for the Mojave Desert Planning Area" included in the FEIR (page 4.2-15), defines "High Winds" as "When wind gusts exceed 40 kilometers (25 miles) per hour or, on an hourly average, when wind speeds exceed 24 kilometers (15 miles) per hour. The average wind speed determination shall be on a 15 minute average at the nearest meteorological station or by wind instrument on site." Therefore, while the EIR mitigation measure AIR-1e correctly references <u>the maximum wind speed of 25 mph</u>, the MAQMD definition of high winds further clarifies the applicability of <u>the hourly average wind speed of 15 mph</u>. From an implementation standpoint, PG&E's practice has been to conduct dust suppression to minimize the generation of visible dust during high wind conditions in compliance with the EIR mitigation measure. PG&E defers	EIR mitigation measure AIR-1e condition for which dust control is necessary (i.e. when visible dusting occurs from moist and dry surfaces due to wind erosion) is less onerous than a continuously measured wind speed as proposed by the MAQMD. However, this does not limit PG&E from conducting air monitoring by following MAQMD's guidance to determine "high wind" conditions.		support a curtailment or reduction in nonessential earthmoving activity when visible dusting occurs from moist and dry surfaces due to wind erosion) rather than a dependence on a measured wind speed value of 25 mph.	noted. PG&E Response: PG&E reiterates that our practice at the Topock site has been to conduct dust suppression to minimize the generation of visible dust generated by PG&E activities during high wind conditions (greater than 25 miles per hour) in compliance with the EIR mitigation measure AIR-1e.

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							to DTSC for further clarification on the 25 mph limit stated in EIR mitigation measure AIR-1e, as needed.				
1025	Hualapai/TRC	Non-design	Request for Information	C/RAWP 4.6.2.1 p. 4-21 Dust Control	Curtail or reduce nonessential earth moving activity under high-wind conditions (greater than 25 miles per hour), or develop a plan to control dust during high-wind conditions.	Please provide rationale for the 25 mph limit. When the soil is dry, it doesn't take much to get them moving; the threshold wind velocity only needs to be at about 9 miles per hour (14.5 kilometers per hour) to disrupt the surface. It is suggested that the limit be reduced to 15 mph or rationale be provided on why 25 mph is appropriate and will not result in localized increases in suspended particles.	See above			Hualapai agree with DTSCs response and support a curtailment or reduction in nonessential earthmoving activity when visible dusting occurs from moist and dry surfaces due to wind erosion) rather than a dependence on a measured wind speed value of 25 mph.	See response 1024
1026	Cocopah/TRC	Non-design	Request for Information	C/RAWP 4.6.2.1 p. 4-21 Dust Control	Curtail or reduce nonessential earth moving activity under high-wind conditions (greater than 25 miles per hour), or develop a plan to control dust during high-wind conditions.	Please provide rationale for the 25 mph limit. When the soil is dry, it doesn't take much to get them moving; the threshold wind velocity only needs to be at about 9 miles per hour (14.5 kilometers per hour) to disrupt the surface. It is suggested that the limit be reduced to 15 mph or rationale be provided on why 25 mph is appropriate and will not result in localized increases in suspended particles.	See above			The Tribes agree with DTSCs response and support a curtailment or reduction in nonessential earthmoving activity when visible dusting occurs from moist and dry surfaces due to wind erosion) rather than a dependence on a measured wind speed value of 25 mph.	See response 1024
1027	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP 4.6.2.1 p. 4-21 Dust Control	Curtail or reduce nonessential earth moving activity under high-wind conditions (greater than 25 miles per hour), or develop a plan to control dust during high-wind conditions.	Please provide rationale for the 25 mph limit. When the soil is dry, it doesn't take much to get them moving; the threshold wind velocity only needs to be at about 9 miles per hour (14.5 kilometers per hour) to disrupt the surface. It is suggested that the limit be reduced to 15 mph or rationale be provided on why 25 mph is appropriate and will not result in localized increases in suspended particles.	See above			The Tribes agree with DTSCs response and support a curtailment or reduction in nonessential earthmoving activity when visible dusting occurs from moist and dry surfaces due to wind erosion) rather than a dependence on a measured wind speed value of 25 mph.	See response 1024
1028	FMIT/TRC	Non-design	Other	C/RAWP Section 4.6	Figure 4.6-2	The legend in this figure is incorrect. The purple-line indicates Noise-Sensitive Receptors, rather than, as labelled, Noise Monitoring Station	The figure legend will be revised as noted.		Noted.		
1029	Hualapai/TRC	Non-design	Other	C/RAWP Section 4.6	Figure 4.6-2	The legend in this figure is incorrect. The purple-line indicates Noise-Sensitive Receptors, rather than, as labelled, Noise Monitoring Station	See above			Comment noted.	
1030	Cocopah/TRC	Non-design	Other	C/RAWP Section 4.6	Figure 4.6-2	The legend in this figure is incorrect. The purple-line indicates Noise-Sensitive Receptors, rather than, as labelled, Noise Monitoring Station	See above			Comment noted.	
1031	Chemehuevi/ TRC	Non-design	Other	C/RAWP Section 4.6	Figure 4.6-2	The legend in this figure is incorrect. The purple-line indicates Noise-Sensitive Receptors, rather than, as labelled, Noise Monitoring Station	See above			Comment noted.	
Specific Comments – Construction/Remedial Action Work Plan, Section 5: Construction Contingency Plan/Procedures											
1032	DOI-183	Non-design	Editorial	Table 5.1-2	Likely Causes for Failure -	Page 5-5. The first failure mode discusses major breakdowns but only identifies "Acts of God" as the cause. Expand the causes to include human error and various construction and startup	The following text will be added under the		Resolved.		Comment resolved.

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					Acts of God	activities.	"Likely Causes for Failure": • Human error • Construction and startup activities				
Specific Comments – Construction/Remedial Action Work Plan, Section 6: Post Construction and Startup Activities											
1033	DOI-184	Non-design	Other	6.1/6-1	In general, the revegetation approach will be informed by the preconstruction condition, as documented through ground photographic records, topographic/aerial maps, disturbed area map, archaeological surveys, historical resource surveys, and biological surveys. The goal is to restore the areas affected by construction as close as possible to preconstruction conditions.	The preconstruction conditions for the revegetation should also consider conditions prior to the groundwater interim measure(s) implementation.	This is exactly what is implied in the beginning of the sentence. The term 'pre-construction condition' means before the implementation of the groundwater interim measure and final remedy.		Resolved.		Comment resolved.
1034	FMIT/TRC	Non-design	Request for Information	C/RAWP 6.1.1.2 p. 6-2 Approaches for Restoration and Revegetation	When the trees are too large to be reliably transplanted, the lost trees will be replaced with new trees of the same species grown in containers within a commercial plant nursery from locally collected seeds, if available.	What will be done if these seeds/plants are not available?	It is considered highly unlikely that there would be no individual plants on the site that produce any seed in any year. The backup plan to locally collected seeds will be to use the same species of plants already being produced by the commercial nursery that specialize in them.			Noted.	
1035	Hualapai/TRC	Non-design	Request for Information	C/RAWP 6.1.1.2 p. 6-2 Approaches for Restoration and	When the trees are too large to be reliably transplanted, the lost trees will be replaced	What will be done if these seeds/plants are not available?	See above			Noted.	

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				Revegetation	with new trees of the same species grown in containers within a commercial plant nursery from locally collected seeds, if available.						
1036	Cocopah/TRC	Non-design	Request for Information	C/RAWP 6.1.1.2 p. 6-2 Approaches for Restoration and Revegetation	When the trees are too large to be reliably transplanted, the lost trees will be replaced with new trees of the same species grown in containers within a commercial plant nursery from locally collected seeds, if available.	What will be done if these seeds/plants are not available?	See above			Noted.	
1037	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP 6.1.1.2 p. 6-2 Approaches for Restoration and Revegetation	When the trees are too large to be reliably transplanted, the lost trees will be replaced with new trees of the same species grown in containers within a commercial plant nursery from locally collected seeds, if available.	What will be done if these seeds/plants are not available?	See above			Noted.	
1038	DOI-185	Non-design	Editorial	6.1.1.6/6-3	Tree and shrub protectors will be maintained until the plants are large enough to withstand herbivory or before the growth of the plant being impacted by the barrier.	Revise text to: Tree and shrub protectors will be maintained until the plants are large enough to withstand herbivory or before the growth of the plant is impacted by the protector.	Text will be revised as directed.		Accepted.		Comment resolved pending DOI review of the final design documents.
1039	FMIT/TRC	Non-design	Request for Information	C/RAWP 6.2.2 p. 6-6 Remedy Startup,	Upon DTSC concurrence that the system is ready to be	Specifically does this suggest that the groundwater startup date is officially considered the day IM-3 is turned off?	The IM3 system will be turned off when the groundwater remedy equipment and facilities			The most recent information provided in the August, 2015 TWGs indicates a change per	DTSC response: Tribal comment noted. Discussion on construction phasing

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				Including Shutdown and Layup of IM	turned off, PG&E will turn off the IM-3 system, and this date will be the "startup date."		are in place and are ready to begin start-up. The remedy equipment and facilities may include the wells for the IRZ along the NTH, the River Bank Extraction wells, the freshwater wells, monitoring wells, the East Ravine/TCS wells, and the pipelines, controls, and electrical and mechanical systems needed to operate these wells. This is consistent with Article 5(B) of the 2012 Settlement Agreement between DTSC and FMIT.			a "Proposed Final Design Construction Sequence". It is understood that the IRZ will commence operation, and IM3 will be turned off, before ALL portions of the remedy are constructed. Elements such as the East Ravine wells and TCS elements will be constructed/ incorporated into the remedy infrastructure afterward. As this particular scheduling element seems to be fluid, this comment is considered unresolved.	and planning will continue.
1040	Hualapai/TRC	Non-design	Request for Information	C/RAWP 6.2.2 p. 6-6 Remedy Startup, Including Shutdown and Layup of IM	Upon DTSC concurrence that the system is ready to be turned off, PG&E will turn off the IM-3 system, and this date will be the "startup date."	Specifically does this suggest that the groundwater startup date is officially considered the day IM-3 is turned off?	See above			The most recent information provided in the August, 2015 TWGs indicates a change per a "Proposed Final Design Construction Sequence". It is understood that the IRZ will commence operation, and IM3 will be turned off, before ALL portions of the remedy are constructed. Elements such as the East Ravine wells and TCS elements will be constructed/ incorporated into the remedy infrastructure afterward. As this particular scheduling element seems to be fluid, this comment is considered unresolved.	DTSC response: Tribal comment noted. Discussion on construction phasing and planning will continue.
1041	Cocopah/TRC	Non-design	Request for Information	C/RAWP 6.2.2 p. 6-6 Remedy Startup, Including Shutdown and Layup of IM	Upon DTSC concurrence that the system is ready to be turned off, PG&E will turn off the IM-3 system, and this date will be the "startup date."	Specifically does this suggest that the groundwater startup date is officially considered the day IM-3 is turned off?	See above			The most recent information provided in the August, 2015 TWGs indicates a change per a "Proposed Final Design Construction Sequence". It is understood that the IRZ will commence operation, and IM3 will be turned off, before ALL portions of the remedy are constructed. Elements such as the East Ravine wells and TCS elements will be constructed/ incorporated into the	DTSC response: Tribal comment noted. Discussion on construction phasing and planning will continue.

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										remedy infrastructure afterward. As this particular scheduling element seems to be fluid, this comment is considered unresolved.	
1042	Chemehuevi/ TRC	Non-design	Request for Information	C/RAWP 6.2.2 p. 6-6 Remedy Startup, Including Shutdown and Layup of IM	Upon DTSC concurrence that the system is ready to be turned off, PG&E will turn off the IM-3 system, and this date will be the "startup date."	Specifically does this suggest that the groundwater startup date is officially considered the day IM-3 is turned off?	See above			The most recent information provided in the August, 2015 TWGs indicates a change per a "Proposed Final Design Construction Sequence". It is understood that the IRZ will commence operation, and IM3 will be turned off, before ALL portions of the remedy are constructed. Elements such as the East Ravine wells and TCS elements will be constructed/ incorporated into the remedy infrastructure afterward. As this particular scheduling element seems to be fluid, this comment is considered unresolved.	DTSC response: Tribal comment noted. Discussion on construction phasing and planning will continue.
Specific Comments – Construction/Remedial Action Work Plan, Section 7: References											
1043	DOI-186	Non-design	Editorial	7/7-1		Add: DOI/DTSC. 2011. Memorandum of Understanding between United States Department of the Interior and California Department of Toxic Substances Control concerning Coordination in Overseeing Implementation of Groundwater Response Actions at PG&E Topock Compressor Station Site. November 22.	Addition will be made as requested. Text will also be added to the Executive Summary and Section 1 (Introduction) of the BOD, Section L1 of the O&M Manual, and Section 1 of the C/RAWP regarding the MOU between DTSC and DOI.		Accepted.		Comment resolved.
Specific Comments – Construction/Remedial Action Work Plan, Appendix A: Construction Quality Assurance Project Plan											
1044	DOI-188	Non-design	Editorial	Acronyms/ ix	Department of Interior	Modify to: Department of the Interior.	Edit will be made as requested.		Accepted.		Comment resolved.
1045	DOI-189	Non-design	Editorial	Certification Page	NA	Ensure that the certification page will be provided with the Final Construction/Remedial Action Work Plan	The certification page will be provided with the Final Construction/ Remedial Action Work Plan.				
1046	DOI-190	Non-design	Editorial	1.1.2/1-5	The USFWS and BOR Comprehensive Management Plan calls for protection of endangered and threatened species and the marsh and wetland habitat, as well	Delete the reference to BOR.	Edit will be made as requested.		Accepted.		Comment resolved.

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					as habitat for migratory, wintering, and nongame avian species (CH2M HILL 2007).						
1047	DOI-191	Non-design	Editorial	1.1.3/1-5	Federal Government: Federal agencies include the DOI, BLM, BOR, USFWS …	Modify this paragraph to the following: Federal agencies include the DOI, BLM, BOR, USFWS, ACHP and USEPA. DTSC and DOI coordinate their oversight activities in accordance with their Memorandum of Understanding (DOI/DTSC 2011). The Federal agencies actively participate in the Consultative Working Group (CWG).	Edit will be made as requested.		Accepted.		Comment resolved.
1048	DOI-192	Non-design	Editorial	1.1.3/1-6	State and Local Governments: The State of California …	This paragraph should be modified to reference the participation of ADEQ, MWD and the RWQCB, CRB, and Mohave County in the CWG. It should also reference the CA and AZ SHPO.	The subject paragraph will be modified as follows in response to this comment (modifications are shown in strikeout [~~strikeout~~; for text deletion] and underline [underline; for text addition]): "**State and Local Governments:** The State of California and local governments, including the Regional Water Quality Control Board, Colorado River Basin Region (RWQCB), the Colorado River Board of California (CRB), and San Bernardino County, as well as the Metropolitan Water District of Southern California, have local resources that are affected or could be affected by former activities and the remedial project. ~~Many of these agencies participate in the CWG.~~ DTSC also works closely with its counterpart in Arizona, the Arizona Department of Environmental Quality (ADEQ), because it is affected by the groundwater system and draws on the Colorado River for water. Other State of Arizona and local governments including Mohave County are also key stakeholders. Additionally, both the California State Historic		Accepted.		Comment resolved.

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							Preservation Officer (SHPO) and the Arizona SHPO are involved in the remedial project. Many of these agencies participate in the CWG.”				
1049	DOI-193	Non-design	Editorial	1.1.3/1-6	Tribal Governments: A number of Native American Indian Tribes …	This paragraph is inaccurate and needs significant modification to include the Federal Section 106 and government-to-government consultation process, the Programmatic Agreement, reference to the nine federally-recognized tribes, and the previously used language regarding the Traditional Cultural Property.	The subject paragraph will be modified as follows in response to this comment (modifications are shown in strikeout [~~strikeout~~; for text deletion] and underline [underline; for text addition]: “**Tribal Governments**: ~~A number of Native American Indian Tribes have lands that border the Colorado River. These tribes are federally recognized sovereign nations that are historically and spiritually rooted in the land and who are economically reliant on the Colorado River. Five tribes located along the river (from north to south): Fort Mojave Indian Tribe, Chemehuevi Indian Tribe, Colorado River Indian Tribes (CRIT), Fort Yuma-Quechan Indian Tribe, and the Cocopah Indian Tribe; together they form the Five Lower River Tribes Coalition. DTSC also communicates regarding the project with other interested~~ the Tribes ~~in southern California and Arizona, including the Hualapai Indian Tribe, Torres-Martinez Desert Cahuilla Indian Tribe, Havasupai Indian Tribe, Twenty-Nine Palms Indian Tribe, and the Yavapai-Prescott Indian Tribe~~. Nine federally-recognized Native American tribes - the		Resolved.		Comment resolved.

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							<u>Chemehuevi Indian Tribe, Cocopah Tribe of Arizona, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Havasupai Indian Tribe, Hualapai Indian Tribe, Quechan Tribe of the Fort Yuma Indian Reservation, Twenty-Nine Palms Band of Mission Indians, and Yavapai-Prescott Tribe - have ties to the area in which the groundwater remedy will be implemented. The Fort Mojave Indian Tribe also owns a parcel of land in this area. The federal government has a trust responsibility to these tribes and has consulted with the tribes, including on a government-to-government basis, throughout the remedy process. The BLM also represents the Federal Agencies for purposes of consulting with the tribes pursuant to Section 106 of the National Historic Preservation Act (NHPA), and other federal laws and Executive Orders, concerning potential adverse effects on cultural and historic properties that may result from the remedy.</u> <u>Pursuant to the NHPA and its implementing regulations (36 CFR 800), the BLM, the U.S. Fish and Wildlife Service, the State Historic Preservation Officers (SHPO) of California and Arizona, the Advisory Council on Historic Preservation (ACHP), and PG&E entered into a Programmatic Agreement (PA) for the Project in 2010. The Hualapai Tribe signed the PA as an Invited Signatory on July 20, 2011. The BLM also</u>				

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							<u>completed and is implementing a Cultural and Historic Properties Management Plan (CHPMP), an overarching treatment plan for the Project, on January 19, 2012.</u> <u>As a state agency, the California Department of Toxic Substances Control (DTSC) respects the sovereignty of tribal governments and "has solicited comments from tribal members throughout the CEQA review and administrative decision-making process" for the Project (EIR; DTSC 2011d). During the CEQA process to study the Project, six tribes "substantially participated in the various administrative processes surrounding remediation of the site with DTSC, PG&E, and DOI, including throughout development of the final remedy." *Id.* The EIR defines these six tribes as the "Interested Tribes." *Id.* The Interested Tribes are "the Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort Mojave Indian Tribe, Fort Yuma-Quechan Indian Tribe, and Hualapai Indian Tribe." *Id.* The term "Interested Tribes" is used throughout the EIR and the mitigation measures required for the Project through DTSC's adoption of the Mitigation Monitoring and Reporting Program (MMRP).</u> <u>The MMRP includes mitigation measures intended to reduce the severity of the Project's</u>				

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							impacts, including the impacts to the Topock Cultural Area, which the EIR defines as the Topock Maze and "the area surrounding the Topock Maze" (EIR; DTSC 2011d). One of the mitigation measures addressing potential impacts to the Topock Cultural Area requires PG&E to submit a Cultural Impact Mitigation Program (CIMP) as part of the final design of the Project. PG&E completed the CIMP and submitted it to DTSC in May 2014 for DTSC's review and approval. DTSC is undertaking additional environmental review pursuant to CEQA to inform its decision on additional Project approvals. The Area of Potential Effects (APE) for the Topock site is contained within what the Fort Mojave Indian Tribe and other Native American Tribes have identified as a larger area of traditional and cultural importance. The Tribes believe that the environmental, cultural, and spiritual resources may not be physically perceptible. DTSC has concluded within the January 2011 certified Environmental Impact Report (EIR; DTSC 2011d) that the 779.2-acre project site "appears to qualify as a historic resource under CEQA [California Environmental Quality Act] as an area that is significant in the social and cultural annals of California," and the BLM also has determined that a traditional cultural property or property of				

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							traditional religious and cultural significance that is eligible for listing on the National Register of Historic Places exists in the area of the Topock project, within the current APE, consisting of 1,600 acres of surface area and a section of the Colorado River.				
1050	JDS-7	Non-design	Editorial	Appendix A; p. 1-6	Tribal Government	Acknowledge that FMIT is landowner in the Site	See text edit above in response to this comment (first paragraph, 2nd sentence).		Noted.	Noted.	
1051	DOI-194	Non-design	Editorial	1.2/1-7	Identification of construction QA objectives…	Specific construction QA objectives are not provided in the CQAPP. Please add these objectives.	The following text will be added to the first paragraph of Section 3 (Plan for Quality): The objectives of the Topock Construction QA program are to 1) verify the implementation and effectiveness of the Contractor's QC program, 2) ensure that the constructed work products comply with the quality requirement established in the contract documents, 3) ensure communication of changes to the approved CQAPP are made to the contractors, and 4) establish and maintain quality records that verify conformance to contract requirements and the CQAPP.		Resolved.		Comment resolved.
1052	JDS-8	Non-design	Editorial	Appendix A; p. 1-7	Quality Program Overview	Use consistent terms QA manager is term of used on Appendix A while main body text uses QC Contractor on organization chart exhibit 2.1-1. Attempt to use consistent terms throughout.	Comment noted. In general, the construction contractor and its subcontractors are responsible for QC of constructed work products as well as the necessary inspections and tests required to ensure that the work complies with the contract documents. The QC personnel and related QC support services are independent from PG&E's QA organization.			Noted.	

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							The QA Manager and QA personnel ensure that the contractor's QC is working effectively and that the resultant construction complies with the quality requirements established by the contract.				
1053	DOI-195	Non-design	Editorial	2.1.2/2-1	The DOI, BOR, and BLM are the federal agencies overseeing response actions for land under their jurisdiction …	Modify this paragraph to the following: The DOI is the lead federal agency overseeing response actions for land under its jurisdiction, custody, or control near the Compressor Station pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In July 2005, PG&E and the federal agencies (DOI, U.S. Bureau of Land Management (BLM), U.S. Fish and Wildlife Services (USFWS), and U.S. Bureau of Reclamation [BOR]) entered into an Administrative Consent Agreement (DOI 2005). In addition, PG&E and the United States executed a Remedial Design/Remedial Action Consent Decree (CD), on behalf of DOI, under CERCLA in 2012, which was approved by the U.S. District Court for the Central District of California in November 2013. These federal agencies will review the Construction/Remedial Action Work Plan as well as this CQAPP and DOI will approve these documents on behalf of the bureaus. Additionally the Federal agencies will oversee, review, and verify the remedy is constructed in accordance with the final design, performance standards (including ARARS) and related QA/QC requirements.	The subject paragraph will be modified as requested.		Accepted.		Comment resolved.
1054	DOI-196	Non-design	Editorial	2.1.3/2-2	PG&E is also responsible for formal communications with and submittals to DTSC, DOI, Tribes, and other stakeholders, as required.	PG&E is responsible for formal communication with the agencies. DTSC and DOI are responsible for formal communications with the Tribes and stakeholders.	The subject sentence will be modified as follows in response to this comment (modifications are shown in underline [underline; for text addition]): "PG&E is also responsible for formal communications with and submittals to DTSC~~,~~ and DOI. DTSC and DOI are responsible for formal communications and submittals with the Tribes and other stakeholders, as required."		Resolved.		Comment resolved.
1055	DOI-197	Non-design	Editorial	2.2/2-3	Figure 2-1	Please identify the significance of dashed and solid lines. If dashed lines mean a line of communication, it would appear that the line between the Corporate Quality Assurance Official and the Quality Assurance Manager would be a solid line, i.e., a line of authority. Furthermore, the Quality Assurance Manager should not be under the authority of the Topock Project Manager. The Quality Assurance Manger must be independent and therefore the line should be dashed. Please clarify and edit accordingly.	Dashed lines are lines of communication. Solid lines are lines of authority, responsibility, and communication. Figure 2-1 was revised to reflect current organization for construction and in response to this comment (see **Attachment X** of the final RTC table). Text will also be revised to reflect the figure.		Resolved.		Comment resolved.
1056	DOI-198	Non-design	Editorial	2.3/2-4	Given that personnel assignments	DOI understands that personnel assignments are subject to change; however, a table should be provided in the Final CQAPP showing planned CQAPP personnel assignments, their role, a summary of their responsibilities, their contact information, and a brief summary of their education and	As DOI noted, personnel assignments are subject to change. Key changes		Resolved.		Comment resolved.

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					are subject to change during construction, the Topock Project Manager will maintain a staffing list of CQAPP personnel assignments, including each person's role and responsibilities.	experience qualifications that verifies they meet the qualification shown in Table 2-1.	to the organization or personnel will be included in the monthly progress reports during construction (see Section 2 of Exhibit 2.6-2, Monthly Progress Report Template). The monthly reports will be formally submitted to DTSC and DOI, and will be posted on a SharePoint site for access for Tribes and stakeholders. In addition, the QA manager will keep on file in the CHQ, the information requested by the comment.				
1057	DOI-199	Non-design	Editorial	2.3.1.9/2-9	PG&E will specify what aspect or aspects of the construction process (e.g., wells and building envelopes) will require third-party testing services.	Given this is the 90% design, the construction areas requiring third-party testing services should be known. Please provide a description of the expected services.	A draft third-party testing and inspection plan by QA was developed based on the testing frequencies included in the 90% technical specifications (see **Attachment Y** of the final RTC table). PG&E will continue to refine the plan so this information should be considered preliminary.		Resolved.		Comment resolved.
1058	DOI-200	Non-design	Editorial	2.5/2-11	PG&E personnel will receive ongoing training to maintain and improve their technical skills and level of competence to perform the work in their assigned roles.	Please identify any specialized training or certifications required for this project and discuss how this training will be provided. This discussion should include site- and project-specific training for personnel new to the site.	As mentioned in the second paragraph of Section 2.5 (Competence, Awareness, and Training), prior to the start of project, the Chromium Remediation Director and the Topock Project Manager will assess the project-specific staffing needs and implement training, as necessary. For remedy construction, this assessment will be done with inputs from the PG&E Construction Manager and the QA Manager. In general, implementation of training will be conducted by the PG&E Construction Manager or designee. Training for QA activities will be implemented by the QA Manager. PG&E will provide updates on		Resolved.		Comment resolved.

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							personnel training to the agencies as construction planning progress.				
1059	DOI-201	Non-design	Editorial	Appendix A, Section 2.5, Page 2-11	Records of qualifications, training, indoctrination, briefings, and project-specific training are documented and maintained.	Please indicate where and by whom records of qualifications, training, indoctrination, briefings, and project-specific training are documented and maintained.	The PG&E Construction Manager, or designee, is responsible for ensuring that records of qualification, training, indoctrination, briefings, and project-specific training are documented and maintained. The CHQ will serve as the primary repository for records during construction.		Resolved.		Comment resolved.
1060	DOI-202	Non-design	Editorial	3.1/3-1	…when changes to the CQAPP are planned and implemented… Needed CQAPP changes are planned and controlled to ensure that the integrity of the CQAPP is maintained. All responsible and relevant members of the team and support personnel, including all relevant contractors, subcontractors, and sub-consultants will be informed of the changes in details to ensure conformance to the CQAPP.	Please discuss what actions require a revision to the CQAPP (e.g. changes in project scope, personnel, lessons learned, etc.) and include a distribution list of individuals that will receive a copy of the revised, approved CQAPP.	The following edits will be made to Section 3.1 in response to this comment (edits are shown in underline [underline; for text addition]): "This QA Program is based on the concept that work performance is a process that can be planned, performed, assessed, and improved. The QA Manager implements and maintains this CQAPP throughout the course of the project. PG&E Management ensures that the processes outlined in this plan are implemented in order to meet project requirements, and that the integrity of the quality management system is maintained when changes to the CQAPP are planned and implemented. Changes in the project scope or organization structure, and lessons learned from implementation of the CQAPP are monitored and discussed among all team members. When a revision to the CQAPP is deemed necessary by the QA Manager, ~~N~~ needed CQAPP changes ~~are~~ will be planned, controlled,		Accepted.		Comment resolved.

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							and approved by the QA Manager to ensure that the integrity of the CQAPP is maintained. All responsible and relevant members of the team and support personnel, including all relevant contractors, subcontractors, and sub-consultants will be informed of the changes in details to ensure conformance to the CQAPP. At a minimum the following individuals or their designee will receive a copy of the revised, approved CQAPP: Topock Project Manager QA Field Supervisor QA Field Inspectors Construction Manager Site Operations Manager Engineer of Record DTSC Project Manager DOI Project Manager Contractors Project Manager Subcontractors Project Manager Sub-consultants Project Manager".				
1061	DOI-203	Non-design	Editorial	3.2/3-1	The Construction Manager administers and controls the processing of supplier/ contractor submittals…	Please provide examples of supplier and contractor submittals.	An example of Supplier submittal is a HDPE pipe material submittal, which comprises of a manufacturer cut sheet showing materials properties in compliance with the specifications. An example of Contractor submittal is the training records for contractor personnel, documenting that contractor's proposed personnel have received the required training required in the technical specifications.		Resolved.		Comment resolved.
1062	DOI-204	Non-design	Editorial	3.4/3-5	Procedures will be established to define the controls needed for the following tasks…	These procedures should be defined and included in Final CQAPP.	Procedures will be defined and included in the final CQAPP.		Accepted.		Comment resolved pending DOI review of the final design documents.
1063	DOI-205	Non-design	Editorial	3.4.1.2/3-6	A daily	Is this the same report identified as a Daily Quality Surveillance Report in Appendix B? Please clarify	Yes, the Daily Quality		Resolved.		Comment resolved.

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					construction report is prepared by the QC Inspectors….	and revise accordingly.	Surveillance Report in Appendix B is provided as an example daily construction report prepared by the QC inspectors. Construction contractors will be allowed to use a form at its own choosing, so long as the content meets the CQAPP requirements as outlined in Section 3.4.1.2 (Daily Construction report).				
1064	DOI-206	Non-design	Editorial	3.4.1.4/3-7	These are referred to as red-line drawings. If there is a change to a specified material, dimension, location, or other feature, the as-built drawing indicates the work performed.	The title of this section is Record Drawings but this term is not used in the section, but rather, red-line and as-built drawings are used. Please clarify. Also, before the word "change" please insert "Owner-approved".	The final as-built drawings, after incorporating the markups, are the Record Drawings. The word "Owner-approved" will be inserted before the word "change" as requested.		Accepted.		Comment resolved.
1065	DOI-207	Non-design	Editorial	3.4.2.2/3-8	Daily construction QA logs	Is this the same report identified as a Daily Quality Surveillance Report in Appendix B? Please clarify and revise accordingly	No, the daily construction QA log records the daily events for QA. The daily quality surveillance report records material inspection and testing for the day. Text will be clarified.		Accepted pending final review.		Comment resolved pending DOI review of the final design documents.
1066	DOI-208	Non-design	Editorial	3.5/3-8	The type and extent of control applied to the supplier and the purchased products/services depends on the effect of the products/ services on subsequent product realization of the final product/service.	This statement is confusing. Please clarify and revise accordingly	The degree of control over contractor-purchased supplies or services depends on how critical that purchased supply or service is on successful construction of the remedy, or the complexity of that supply or service, in the professional judgment of the Owner and/or Engineer. For example, the Owner or Engineer would specify a higher level of contractor procurement oversight and control for highly complex remedy well construction services compared to relatively straightforward		Accepted.		Comment resolved pending DOI review of the final design documents.

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							procurement such as temporary construction fencing. Text will be clarified to reflect this response.				
1067	DOI-209	Non-design	Editorial	3.5/3-8	The Owner evaluates and selects contractors based on their ability to supply products and/or services in accordance with the organization's requirements. Criteria for selection, evaluation, and reevaluation are established and will be implemented for this groundwater remedy.	Please reference where these criteria are defined. Also, is the organization cited here PG&E or the contractor?	Contractor selection requirements are typically defined in the project specifications and contractor procurement documents. Contractor procurement documents, such as Requests for Proposals, will reference the relevant project specifications that describe contractor qualification requirements and the technical requirements for the work, and the Requests for Proposal will also detail the non-technical criteria for contractor selection. Examples of non-technical contractor selection criteria to be included in a Request for Proposal include contractor organization financial requirements, insurance and bonding requirements, contractor organization health and safety performance metrics, diversity classification, etc. The organization referenced in this sentence refers to the Owner's organization. The Owner would be PG&E or their contracted designee who is given contractual authority to evaluate and select contractors.		Resolved.		Comment resolved.
1068	DOI-210	Non-design	Editorial	3.5.4/3-9	When required, QA personnel must develop, review, and approve source inspection plans	Please provide examples of when source inspection plans are required.	Examples where source inspection plans may be required include internal surge suppressors, coating surfaces, and tanks. The need for source inspection will depend on the level of complexity and review		Accepted.		Comment resolved pending DOI review of the final design documents.

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							of vendor submittals. These examples will be added to the text of the CQAPP.				
1069	DOI-211	Non-design	Editorial	4.1.5/4-5	The contractor/ subcontractor will submit to the Resident Engineer the sources of supply and item material types that will be used in the work in accordance with contract requirements.	Approval of sources of supply is a QA function. It seems this requirement should be handled by the QA Manager to avoid responsibility confusion and possible breakdown of the QA process. Please clarify.	The submittal of sources of supply by the Construction Contractor should be made to the Resident Engineer in accordance with the document submittal process administered by the Construction Manager (see Section 3.2). The Resident Engineer will provide the submittal to the QA Manager for review and approval. The QA Manager will also develop source inspection criteria and QA personnel will conduct source inspection as deemed necessary (See Sections 4.1.6 and 4.1.7). For clarity, the following edits will be made (edits are shown in strikeout [~~strikeout~~; for text deletion] and underline [<u>underline</u>; for text addition]): • 3rd paragraph of Section 4.1.5: "…The ~~PG&E Resident Engineer/~~QA Manager will approval select sources of supply…" • 1st paragraph of Section 4.1.6: "…Material certification is documented from the source that the materials conform to contract specifications and the ~~Resident Engineer or~~ QA Manager's approved suppliers/vendors list…"		Resolved.		Comment resolved.

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							• 2nd paragraph of Section 4.1.6: "Substitution of specified materials cannot occur without prior approval by the Construction Manager/Resident Engineer, who will consult with the QA Manager and the appropriate Engineer of Record…"				
1070	DOI-212	Non-design	Editorial	4.2/4-7	The Contractor must establish a program for inspection of activities affecting quality and must cover all construction activities, including both onsite and offsite operations.	In Section 4.2.1 and 4.2.3 the text states that the Contractor and/or Owner's QA designee performs inspections, and in Section 4.2.2, it states the Contractor performs the inspection. Since it is the Contractor's responsibility to perform the four phase inspections, it seems the Contractor should always be responsible for the inspections. Please clarify.	The Construction Contractor is responsible for performing the four phase inspections. QA personnel will conduct surveillance and audit of the contractor's four phase inspections in coordination with the Construction Manager (see Sections 2.3.1.6 through 2.3.18). For clarity, the following edits will be made (modifications are shown in strikeout [~~strikeout~~; for text deletion] and underline [underline; for text addition]): • 1st paragraph of Section 4.2.1: "The Contractor ~~and/or Owner's QA designee~~ performs preparatory inspections prior to…" • 1st paragraph of Section 4.2.3: "The Contractor ~~and/or Owner's QA designee~~ perform follow-up inspections periodically during…"		Accepted.		Comment resolved.
1071	DOI-213	Non-design	Editorial	4.3/4-12	Table 4-3 Title	Please add "Nonconformance" before "Findings".	Edit will be made as requested.		Accepted.		Comment resolved.
1072	DOI-214	Non-design	Editorial	4.4/4-12	NA	Please provide discussion of audit frequency in Section 4.4.	Audits are scheduled based on risk and complexity of the activities and processes being implemented. As a guideline, one audit will		Accepted.		Comment resolved pending DOI review of the final design documents.

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							be conducted by a qualified Lead Auditor each year for each of Definable Features of Work (DFOW). Examples of DFOW listed in C/RAWP Table 4-1 are: • Earthwork (grading, excavation, compaction, backfill) • Subgrade Concrete (footings, foundations) • Structural (slab on grade, fabricated steel, tank erection, welding) • Architectural (wall construction and finishes, paintings and coatings, roof coverings) • Plumbing (domestic piping, drain-waste-vent, natural gas supply piping) • Electrical (conduit cable trays, distribution systems, protection systems) • Mechanical and Piping (equipment installation, pumps, valves, compressors, piping assemblies, heating equipment, cooling equipment, ductwork) • Controls and Instrumentation (installation and commissioning). Audits may be conducted more frequently based on risk and complexity. Audits may also incorporate several DFOW into one audit. After construction contractors are selected and construction schedules identified, on-site and off-site (shop fabrication) audits can be determined and scheduled. Text will be added to Section 4.4 to document				

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							this response.				
1073	DOI-215	Non-design	Editorial	4.5.1/4-17	Bullets	Throughout these bullets, the phrase "as determined by the QSR" is used. It appears the phrase should be "and documented in the QSR". Please clarify and revise accordingly.	The following edit will be made to bullets #8, 10, 12, and 13 in response to this comment (edits are shown in underline [underline; for text addition]): "…as determined by and documented in the QSR."		Accepted.		Comment resolved.
1074	DOI-216	Non-design	Editorial	5.2/5-1	The Construction Manager notifies the Contractor of noncompliance with any of the foregoing requirements.	The Contractor is also responsible to identify and report non-conforming items using its own QA process. Please revise this statement accordingly.	The first paragraph of Section 5.2 will be modified as follows in response to this comment (modifications are shown in underline [underline; for text addition]): "The Contractor is responsible for QC of constructed work products as well as the necessary inspections and tests required to ensure that the work complies with the contract documents. When material, performed work, or installation is found deficient through the Contractor's own QA/QC process and/or PG&E's QA process, the Contractor must ensure that the nonconforming material, work, or installation is identified and controlled to prevent unintended use or delivery. The Construction Manager notifies the Contractor of noncompliance with any of the foregoing requirements. The Contractor must, after receipt of such notice, immediately take corrective action".		Accepted.		Comment resolved.
1075	DOI-217	Non-design	Editorial	5.3/5-2	Project personnel identify and document the nonconforming product	Please clarify the NCR process. It seems this statement should indicate Contractor personnel, but it could also be the QA Manager or designee. Please revise accordingly.	Bullet #1 in Section 5.3 will be clarified as follows in response to this comment (edits are shown in underline [underline; for text addition]): "1. Project (Contractor		Accepted.		Comment resolved.

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							and/or QA) personnel identify and document the nonconforming product on an NCR (Appendix B)…”				
Specific Comments – Construction/Remedial Action Work Plan, Appendix B: Standard Operating Procedures											
1076	FMIT/TRC	Non-design	SOPs	C/RAWP Append B SOP-A7	Water Level Measurements	Because of the importance of water-level measurements for determination of OPS and OF, it is not specified in the 90% BOD whether transit/level surveys would be conducted to determine altitude of water-level measuring points at wells. Altitude of wells determined by GPS is not accurate enough when measuring water levels to 0.01 ft.	All monitoring wells are surveyed to 0.01-foot for water level measuring point (typically ‘top of casing’) and to 0.1 foot for ground surface at wellhead (and for stick-up wells, the top of protective monument). This work has been done by PG&E land survey crews, not determined by GPS. This information will be included in the design criteria in Appendix C (Section C.2.1).			There appears to be an anomaly in the PG&E topographic map when comparing the California and Arizona sides of the Colorado River. If you stand on the western river bank on contour 475 ft and look perpendicular to the flow across the river, you should be looking at contour 475 on the other side because it is a man-made trapezoidal channel with engineered banks. However, the corresponding topographic contours on the Arizona side do not match up. Causes of the anomaly are uncertain, but could be related to differences in elevation of benchmarks on the California and Arizona sides that were used for the photogrammetric survey. As these possible benchmark elevation differences could be causing confusion over water levels in MW- 54 and MW-55, it would be most helpful to have the surveys checked and verified. Checking with differential GPS (within +1 to 3 cm) would be a good starting point. Comment unresolved pending development of a plan to resurvey the altitudes of wells located on the Arizona side.	PG&E Response: The mapping on both sides of the river was based on the same High Precision Geodetic Network (HPGN) benchmark. The well elevations are also tied to this same single benchmark. It’s not clear from the comment exactly what is thought to be an anomaly, but if there is a discrepancy in a topo map it is likely due to some slight imprecision in the positioning of features on the figure and not due to the use of different benchmarks on different sides of the river.
1077	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B SOP-A7	Water Level Measurements	Because of the importance of water-level measurements for determination of OPS and OF, it is not specified in the 90% BOD whether transit/level surveys would be conducted to determine altitude of water-level measuring points at wells. Altitude of wells determined by GPS is not accurate	See above			There appears to be an anomaly in the PG&E topographic map when	See response 1076

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						enough when measuring water levels to 0.01 ft.				comparing the California and Arizona sides of the Colorado River. If you stand on the western river bank on contour 475 ft and look perpendicular to the flow across the river, you should be looking at contour 475 on the other side because it is a man-made trapezoidal channel with engineered banks. However, the corresponding topographic contours on the Arizona side do not match up. Causes of the anomaly are uncertain, but could be related to differences in elevation of benchmarks on the California and Arizona sides that were used for the photogrammetric survey. As these possible benchmark elevation differences could be causing confusion over water levels in MW- 54 and MW-55, it would be most helpful to have the surveys checked and verified. Checking with differential GPS (within +1 to 3 cm) would be a good starting point. Comment unresolved pending development of a plan to resurvey the altitudes of wells located on the Arizona side.	
1078	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B SOP-A7	Water Level Measurements	Because of the importance of water-level measurements for determination of OPS and OF, it is not specified in the 90% BOD whether transit/level surveys would be conducted to determine altitude of water-level measuring points at wells. Altitude of wells determined by GPS is not accurate enough when measuring water levels to 0.01 ft.	See above			There appears to be an anomaly in the PG&E topographic map when comparing the California and Arizona sides of the Colorado River. If you stand on the western river bank on contour 475 ft and look perpendicular to the flow across the river, you should be looking at contour 475	See response 1076

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										on the other side because it is a man-made trapezoidal channel with engineered banks. However, the corresponding topographic contours on the Arizona side do not match up. Causes of the anomaly are uncertain, but could be related to differences in elevation of benchmarks on the California and Arizona sides that were used for the photogrammetric survey. As these possible benchmark elevation differences could be causing confusion over water levels in MW-54 and MW-55, it would be most helpful to have the surveys checked and verified. Checking with differential GPS (within +1 to 3 cm) would be a good starting point. Comment unresolved pending development of a plan to resurvey the altitudes of wells located on the Arizona side.	
1079	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B SOP-A7	Water Level Measurements	Because of the importance of water-level measurements for determination of OPS and OF, it is not specified in the 90% BOD whether transit/level surveys would be conducted to determine altitude of water-level measuring points at wells. Altitude of wells determined by GPS is not accurate enough when measuring water levels to 0.01 ft.	See above			There appears to be an anomaly in the PG&E topographic map when comparing the California and Arizona sides of the Colorado River. If you stand on the western river bank on contour 475 ft and look perpendicular to the flow across the river, you should be looking at contour 475 on the other side because it is a man-made trapezoidal channel with engineered banks. However, the corresponding topographic contours on the Arizona side do not match up. Causes	See response 1076

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										of the anomaly are uncertain, but could be related to differences in elevation of benchmarks on the California and Arizona sides that were used for the photogrammetric survey. As these possible benchmark elevation differences could be causing confusion over water levels in MW-54 and MW-55, it would be most helpful to have the surveys checked and verified. Checking with differential GPS (within +1 to 3 cm) would be a good starting point. Comment unresolved pending development of a plan to resurvey the altitudes of wells located on the Arizona side.	
1080	FMIT/TRC	Non-design	SOPs	C/RAWP Append B SOP-A8, p. 2	pH measurement using flow-through chamber	Because of the importance of pH to protect the organic rind, pH measurement in flow-through chambers can be affected by the streaming potential, and can be avoided by pH measurement in quiescent water (Wilde and others, 2006, USGS TWRI Book 9, Chapter A6).	If a pH measurement is measured under static conditions, the pH meter will continuously drift, that is caused by a state of equilibrium forming across surface of the glass sensing electrode. By deploying a flow-thru-cell and a flow of about 0.2 gallons/min the water in contact with the pH probe is constantly refreshed. The pH will stabilize very quickly and maintain a constant pH far longer than if measured under static conditions. In the case of multi-parameter probes used during sampling, the probes are calibrated everyday they are used. Calibration is performed to compensate for changes in potential within the measuring and reference electrodes, as well as any change of potential between them. The			pH values by electrometric methods are determined by an iterative and asymptotic approach to the actual pH value. Therefore, the pH probe must be allowed to stabilize, and the final pH value determined when the measured pH shows change of 0.01 unit over a minute. By expecting the asymptotic approach, 95% of the final value can be captured within a shorter time period; however, pH measurement takes time. The pH probe will drift in response to temperature changes and the streaming potential of water flowing past the glass membrane. If pH is measured in quiescent water, probe drift due to the streaming potential is eliminated.	DTSC Response: Tribal comment noted. DTSC will accept pH “flow through” measurements that are consistent with standard industry practice and follow manufacturer instructions (e.g., properly calibrated). Should pH data become critical and suspect at the Topock site, this method can be re-evaluated.

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							calibration also involves checking the slope of the measuring electrode. Slope defines the ability of the measuring electrode to change its output by 59.16 mV per pH unit at 25°C. Virtually all pH instruments use a slope adjustment to compensate for the inability of the measuring electrode to accurately produce its output signal. If the slope falls outside the manufactures' recommended range, the probe is replaced. This information will be included in SOP-A8.			Please consider that accurate and precise measurement of pH in the field is just as great a priority as accurate laboratory measurements of contaminants of concern (e.g. hexavalent chromium); therefore, the time it takes to accurately measure pH in the field should not be compromised. Comment unresolved pending development of a plan to compare pH measurements in flowing and quiescent water.	
1081	Hualapai/TRC						See above			pH values by electrometric methods are determined by an iterative and asymptotic approach to the actual pH value. Therefore, the pH probe must be allowed to stabilize, and the final pH value determined when the measured pH shows change of 0.01 unit over a minute. By expecting the asymptotic approach, 95% of the final value can be captured within a shorter time period; however, pH measurement takes time. The pH probe will drift in response to temperature changes and the streaming potential of water flowing past the glass membrane. If pH is measured in quiescent water, probe drift due to the streaming potential is eliminated. Please consider that accurate and precise measurement of pH in the field is just as great a priority as accurate laboratory measurements of contaminants of	DTSC response: See RTC #1080 above.

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										concern (e.g. hexavalent chromium); therefore, the time it takes to accurately measure pH in the field should not be compromised. Comment unresolved pending development of a plan to compare pH measurements in flowing and quiescent water.	
1082	Cocopah/TRC						See above			pH values by electrometric methods are determined by an iterative and asymptotic approach to the actual pH value. Therefore, the pH probe must be allowed to stabilize, and the final pH value determined when the measured pH shows change of 0.01 unit over a minute. By expecting the asymptotic approach, 95% of the final value can be captured within a shorter time period; however, pH measurement takes time. The pH probe will drift in response to temperature changes and the streaming potential of water flowing past the glass membrane. If pH is measured in quiescent water, probe drift due to the streaming potential is eliminated. Please consider that accurate and precise measurement of pH in the field is just as great a priority as accurate laboratory measurements of contaminants of concern (e.g. hexavalent chromium); therefore, the time it takes to accurately measure pH in the field should not be compromised. Comment unresolved	DTSC response: See RTC #1080 above.

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										pending development of a plan to compare pH measurements in flowing and quiescent water.	
1083	Chemehuevi/ TRC						See above			pH values by electrometric methods are determined by an iterative and asymptotic approach to the actual pH value. Therefore, the pH probe must be allowed to stabilize, and the final pH value determined when the measured pH shows change of 0.01 unit over a minute. By expecting the asymptotic approach, 95% of the final value can be captured within a shorter time period; however, pH measurement takes time. The pH probe will drift in response to temperature changes and the streaming potential of water flowing past the glass membrane. If pH is measured in quiescent water, probe drift due to the streaming potential is eliminated. Please consider that accurate and precise measurement of pH in the field is just as great a priority as accurate laboratory measurements of contaminants of concern (e.g. hexavalent chromium); therefore, the time it takes to accurately measure pH in the field should not be compromised. Comment unresolved pending development of a plan to compare pH measurements in flowing and quiescent water.	DTSC response: See RTC #1080 above.
1084	FMIT/TRC	Non-design	SOPs	C/RAWP Append B SOP-A9, p. 2	Dissolved Oxygen Measurements	Because dissolved oxygen is important to measuring the progress of the remedy, amperometric dissolved oxygen cells, such as used by the YSI-556 multimeter, are prone to fouling and drift when exposed to hydrogen sulfide, and the groundwater remedy is expected to produce hydrogen sulfide	As mentioned in the SOP, the In-Situ Troll 9500 is also used for			It is most helpful to calibrate the DO meter to a zero-DO calibration	DTSC response: Comment noted.

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						as a byproduct. Use of an optical or luminescence-based sensor is recommended for measurement of dissolved oxygen concentrations in groundwater at the site.	monitoring purge water quality at Topock. The 9500 In-Situ Smart-Troll Sonde uses an optical O2 sensor. The SOP will be clarified to state that instruments with optical DO sensors (such as the In-Situ Troll) are the primary DO measurement instruments, and the YSI-556 will be used as a back-up.			standard, which can be made up in the field lab by adding sodium sulfite to deionized water until saturation. Sulfite oxidizes to sulfate and scavenges oxygen from the water. Use a tightly sealed glass bottle for transport of the zero-DO calibration standard. Comment resolved pending verification of the procedure within 100% design.	
1085	Hualapai/TRC						See above			It is most helpful to calibrate the DO meter to a zero-DO calibration standard, which can be made up in the field lab by adding sodium sulfite to deionized water until saturation. Sulfite oxidizes to sulfate and scavenges oxygen from the water. Use a tightly sealed glass bottle for transport of the zero-DO calibration standard. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1086	Cocopah/TRC						See above			It is most helpful to calibrate the DO meter to a zero-DO calibration standard, which can be made up in the field lab by adding sodium sulfite to deionized water until saturation. Sulfite oxidizes to sulfate and scavenges oxygen from the water. Use a tightly sealed glass bottle for transport of the zero-DO calibration standard. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1087	Chemehuevi/ TRC						See above			It is most helpful to calibrate the DO meter to a zero-DO calibration standard, which can be made up in the field lab	Comment resolved pending verification of the procedure within 100% design.

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										by adding sodium sulfite to deionized water until saturation. Sulfite oxidizes to sulfate and scavenges oxygen from the water. Use a tightly sealed glass bottle for transport of the zero-DO calibration standard. Comment resolved pending verification of the procedure within 100% design.	
1088	FMIT/TRC	Non-design	SOPs	C/RAWP Append B SOP-A12	Sample transferred to bucket for measurement	Because dissolved oxygen is important to measuring the progress of the remedy, if the amperometric measurement method is being used to determine dissolved oxygen, there needs to be at least a 1 foot per second velocity of water passing the DO membrane (USGS, 2013, Chapter A6, Field Measurements); therefore, measurement of DO in a bucket is not recommended. Measurement in the flowing stream is recommended, or the DO probe can be moved back and forth in the bucket to achieve the 1 fps requirement.	Water quality measurements are typically not collected from a bucket but rather from a flow-thru-cell with a flow of 0.2 gallons/min. This SOP covers collection of water quality measurements when a flow-through cell cannot be used, for example, surface water sample collection, active extraction well sampling, screening samples collected during drilling operations, grab samples from a well using a bailer, groundwater sample using a Hydrasleeve sampler, etc. The sampler is instructed to note in the field forms that the dissolved oxygen and oxidation-reduction potential results are approximate because a flow-through cell could not be used (see Item 4 under Measurements in the SOP). The following sentence will be added at the end of Item 2 under Measurement: "<u>Move the probe back and forth</u>."			It is most helpful to calibrate the DO meter to a zero-DO calibration standard, which can be made up in the field lab by adding sodium sulfite to deionized water until saturation. Sulfite oxidizes to sulfate and scavenges oxygen from the water. Use a tightly sealed glass bottle for transport of the zero-DO calibration standard. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1089	Hualapai/TRC						See above			It is most helpful to calibrate the DO meter to a zero-DO calibration standard, which can be made up in the field lab	Comment resolved pending verification of the procedure within 100% design.

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										by adding sodium sulfite to deionized water until saturation. Sulfite oxidizes to sulfate and scavenges oxygen from the water. Use a tightly sealed glass bottle for transport of the zero-DO calibration standard. Comment resolved pending verification of the procedure within 100% design.	
1090	Cocopah/TRC						See above			It is most helpful to calibrate the DO meter to a zero-DO calibration standard, which can be made up in the field lab by adding sodium sulfite to deionized water until saturation. Sulfite oxidizes to sulfate and scavenges oxygen from the water. Use a tightly sealed glass bottle for transport of the zero-DO calibration standard. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1091	Chemehuevi/ TRC						See above			It is most helpful to calibrate the DO meter to a zero-DO calibration standard, which can be made up in the field lab by adding sodium sulfite to deionized water until saturation. Sulfite oxidizes to sulfate and scavenges oxygen from the water. Use a tightly sealed glass bottle for transport of the zero-DO calibration standard. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1092	FMIT/TRC	Design	SOPs	C/RAWP Append B SOP-A16	Access Routes	The category "Access By Foot Traffic Only" needs to be added for extremely sensitive sites or areas. For example, visitors to the Nazca Lines wear foot protection, why couldn't this be done for the sensitive Topock Cultural Landscape, which remarkably resembles the features exhibited at Nazca? Environmental equipment is readily available for backpack sampling of monitoring wells. In some cases, site visitation could be reduced by the use of remote technology; for example, remotely monitored ion-selective electrodes as surrogates for target analytes.	Refer to RTC #20 FMIT-6. Currently all monitoring wells have existing vehicle access. Other than IRL-4, no new vehicle access paths are anticipated to new wells.			It seems that the definition of "vehicle access path" requires grading, bedding, and road building. There are many sites (e.g. MW-	DTSC response: The agencies will provide direction to PG&E, see DTSC response to comment 69.

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										DD, MW-EE) where vehicles will drive across former maze areas to access the well, yet this doesn't appear to qualify as vehicle access path. Just because a vehicle can access a site by driving doesn't mean that it should be done, particularly if there are impacts that can be avoided by allowing only foot traffic. Foot traffic must be utilized to the fullest extent possible. Comment unresolved pending development of a rigorous site access plan that considers protocols for cultural heritage areas.	
1093	Hualapai/TRC	Design	SOPs	C/RAWP Append B SOP-A16	Access Routes	The category "Access By Foot Traffic Only" needs to be added for extremely sensitive sites or areas. For example, visitors to the Nazca Lines wear foot protection, why couldn't this be done for the sensitive Topock Cultural Landscape, which remarkably resembles the features exhibited at Nazca? Environmental equipment is readily available for backpack sampling of monitoring wells. In some cases, site visitation could be reduced by the use of remote technology; for example, remotely monitored ion-selective electrodes as surrogates for target analytes.	See above			It seems that the definition of "vehicle access path" requires grading, bedding, and road building. There are many sites (e.g. MW-DD, MW-EE) where vehicles will drive across former maze areas to access the well, yet this doesn't appear to qualify as vehicle access path. Just because a vehicle can access a site by driving doesn't mean that it should be done. Foot traffic must be utilized to the fullest extent possible. Comment unresolved pending development of a rigorous site access plan that considers protocols for cultural heritage areas.	The agencies will provide direction to PG&E, see DTSC response to comment 69.
1094	Cocopah/TRC	Design	SOPs	C/RAWP Append B SOP-A16	Access Routes	The category "Access By Foot Traffic Only" needs to be added for extremely sensitive sites or areas. For example, visitors to the Nazca Lines wear foot protection, why couldn't this be done for the sensitive Topock Cultural Landscape, which remarkably resembles the features exhibited at Nazca? Environmental equipment is readily available for backpack sampling of monitoring wells. In some cases, site visitation could be reduced by the use of remote technology; for example, remotely monitored ion-selective electrodes as surrogates for target analytes.	See above			It seems that the definition of "vehicle access path" requires grading, bedding, and road building. There are many sites (e.g. MW-DD, MW-EE) where vehicles will drive across former maze areas to access the well, yet this doesn't appear to	The agencies will provide direction to PG&E, see DTSC response to comment 69.

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										qualify as vehicle access path. Just because a vehicle can access a site by driving doesn't mean that it should be done. Foot traffic must be utilized to the fullest extent possible. Comment unresolved pending development of a rigorous site access plan that considers protocols for cultural heritage areas.	
1095	Chemehuevi/ TRC	Design	SOPs	C/RAWP Append B SOP-A16	Access Routes	The category "Access By Foot Traffic Only" needs to be added for extremely sensitive sites or areas. For example, visitors to the Nazca Lines wear foot protection, why couldn't this be done for the sensitive Topock Cultural Landscape, which remarkably resembles the features exhibited at Nazca? Environmental equipment is readily available for backpack sampling of monitoring wells. In some cases, site visitation could be reduced by the use of remote technology; for example, remotely monitored ion-selective electrodes as surrogates for target analytes.	See above			It seems that the definition of "vehicle access path" requires grading, bedding, and road building. There are many sites (e.g. MW-DD, MW-EE) where vehicles will drive across former maze areas to access the well, yet this doesn't appear to qualify as vehicle access path. Just because a vehicle can access a site by driving doesn't mean that it should be done. Foot traffic must be utilized to the fullest extent possible. Comment unresolved pending development of a rigorous site access plan that considers protocols for cultural heritage areas.	The agencies will provide direction to PG&E, see DTSC response to comment 69.
1096	FMIT/TRC	Design	SOPs	C/RAWP Append B SOP-A16	Access Routes	The SOP describes three access procedures, one of which implies that cultural resources are only a concern in upland areas (procedure C). Does this mean that access procedures are not necessary for cultural resources in other areas? The Tribes disagree with the assertion that cultural resources are only a concern in the upland areas.	Procedure C will be clarified to indicate that cultural resources are a concern in all areas of the project.			Access issues will remain a concern, and it is hopeful that the SOP can be updated as the project progresses. Comment unresolved pending development of a more rigorous site access plan that considers protocols for cultural heritage areas.	DTSC response: Tribal comment noted.
1097	Hualapai/TRC	Design	SOPs	C/RAWP Append B SOP-A16	Access Routes	The SOP describes three access procedures, one of which implies that cultural resources are only a concern in upland areas (procedure C). Does this mean that access procedures are not necessary for cultural resources in other areas? The Tribes disagree with the assertion that cultural resources are only a concern in the upland areas.	See above			Access issues will remain a concern, and it is hopeful that the SOP can be updated as the project progresses. Comment unresolved pending development of a more rigorous site access plan that considers protocols for cultural heritage areas.	DTSC response: Tribal comment noted.

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1098	Cocopah/TRC	Design	SOPs	C/RAWP Append B SOP-A16	Access Routes	The SOP describes three access procedures, one of which implies that cultural resources are only a concern in upland areas (procedure C). Does this mean that access procedures are not necessary for cultural resources in other areas? The Tribes disagree with the assertion that cultural resources are only a concern in the upland areas.	See above			Access issues will remain a concern, and it is hopeful that the SOP can be updated as the project progresses. Comment unresolved pending development of a more rigorous site access plan that considers protocols for cultural heritage areas.	DTSC response: Tribal comment noted.
1099	Chemehuevi/ TRC	Design	SOPs	C/RAWP Append B SOP-A16	Access Routes	The SOP describes three access procedures, one of which implies that cultural resources are only a concern in upland areas (procedure C). Does this mean that access procedures are not necessary for cultural resources in other areas? The Tribes disagree with the assertion that cultural resources are only a concern in the upland areas.	See above			Access issues will remain a concern, and it is hopeful that the SOP can be updated as the project progresses. Comment unresolved pending development of a more rigorous site access plan that considers protocols for cultural heritage areas.	DTSC response: Tribal comment noted.
1100	FMIT/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 2	Fresh water equivalent head calculated using Salinity (%) = TDS/10,051.1	Because of the importance of freshwater equivalent heads for the determination of Operating Properly and Successfully (OPS) and Operational and Functional (OF), this fixed relation does not account for variable densities at the site.	The criteria for measuring OPS are currently under development by the agencies. However, it should be noted that laboratory certified data for analytical parameters, rather than field data, will be used as needed for OPS determinations. This equation does account for variable densities site-wide. The equation uses well-specific SC or TDS value obtained from field parameter at the end of well purging and/or laboratory data collected from discretely screened well to estimate a single salinity value for each monitoring well. The salinity measurement for each well is then used to calculate freshwater equivalent head. See also RTCs #733 and 734.			The response is unclear. Will freshwater equivalent heads be used to determine OPS and OF? If the freshwater equivalent heads do not represent the natural system, but represent an average condition. The Tribe believes that using data representative of the natural system is a better technical approach to making the OPS/OF determination. Comment unresolved pending development of a procedure to accurately represent freshwater equivalent heads.	DTSC response: Tribal comment noted.
1101	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 2	Fresh water equivalent head calculated using Salinity (%) = TDS/10,051.1	Because of the importance of freshwater equivalent heads for the determination of Operating Properly and Successfully (OPS) and Operational and Functional (OF), this fixed relation does not account for variable densities at the site.	See above			The response is unclear. Will freshwater equivalent heads be used to determine OPS and OF? If the freshwater equivalent heads do	DTSC response: Tribal comment noted.

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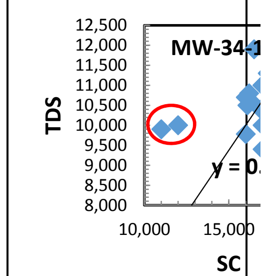
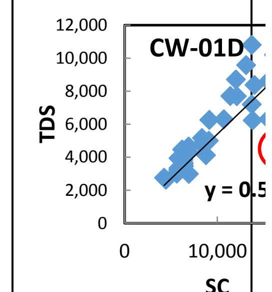
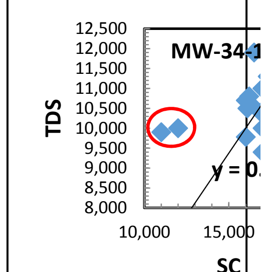
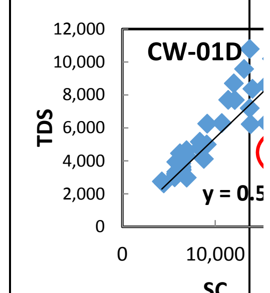
										not represent the natural system, but represent an average condition, then OPS and OF determination using non-representative data is not in the best interest of the Tribes. Comment unresolved pending development of a procedure to accurately represent freshwater equivalent heads.	
1102	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 2	Fresh water equivalent head calculated using Salinity (%) = TDS/10,051.1	Because of the importance of freshwater equivalent heads for the determination of Operating Properly and Successfully (OPS) and Operational and Functional (OF), this fixed relation does not account for variable densities at the site.	See above			The response is unclear. Will freshwater equivalent heads be used to determine OPS and OF? If the freshwater equivalent heads do not represent the natural system, but represent an average condition, then OPS and OF determination using non-representative data is not in the best interest of the Tribes. Comment unresolved pending development of a procedure to accurately represent freshwater equivalent heads.	DTSC response: Tribal comment noted.
1103	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 2	Fresh water equivalent head calculated using Salinity (%) = TDS/10,051.1	Because of the importance of freshwater equivalent heads for the determination of Operating Properly and Successfully (OPS) and Operational and Functional (OF), this fixed relation does not account for variable densities at the site.	See above			The response is unclear. Will freshwater equivalent heads be used to determine OPS and OF? If the freshwater equivalent heads do not represent the natural system, but represent an average condition, then OPS and OF determination using non-representative data is not in the best interest of the Tribes. Comment unresolved pending development of a procedure to accurately represent freshwater equivalent heads.	DTSC response: Tribal comment noted.
1104	FMIT/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22,	Freshwater equivalent head calculated	Because of the importance of freshwater equivalent heads for determination of OPS and OF, use of the fixed 0.65 conversion factor can introduce error and uncertainty into calculation of fresh water equivalent heads. Suggest measuring specific gravity by field or laboratory method, and calculate	The criteria for measuring OPS are currently under			As new data are collected, aquifer chemistry will change	DTSC response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
				p. 3	using TDS = SC * 0.65	freshwater equivalent head by reference density.	development by the agencies. However, it should be noted that laboratory certified data for analytical parameters, rather than field data, will be used as needed for OPS determinations. As presented in Hem, J.D. (1985) Study and Interpretation of the Chemical Characteristics of Natural Waters, USGS Water-Supply Paper 2254, the use of the fixed 0.65 value for the conversion factor provides a reasonable estimate of TDS, with most natural waters having factors that fall between 0.55 - 0.75. Use of the mid-point of the range noted for natural waters as an approximation for the Topock site has not yielded any noticeable issues with the hydraulic gradients calculated from freshwater equivalent heads (see RTC #733). However, where sufficient laboratory TDS data currently exists, a conversion factor will be calculated for each well and the SOP will be modified to reflect this change. In PG&E's opinion, adding the suggested additional step of measuring specific gravity by field or laboratory methods would not likely result in a significant improvement of density estimates for the calculation of freshwater equivalent heads. It is not common practice to measure specific gravity in the field, so the potential measurement error of field measured specific gravity could			due to injection of foreign water. There may be outliers in the data (see examples below), and statistical correlations will shift, causing uncertainty and rendering historical data less useful. Below are examples of conversion factor slopes that might be affected by outlier data (in red circles).   Determination of TDS by residual on evaporation (ROE) would be the most representative method because other methods (i.e. lab sum of major ions) does not include metals and carbon. It is anticipated that samples from the groundwater remedy will have elevated concentrations of metals (Fe, Mn) and carbon.	

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)
Groundwater Remedy Basis of Design Report/Final (100%) Design
PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							introduce greater error than using a well specific conversion factor and field measured specific conductance to estimate TDS. See also RTC #733.				
1105	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 3	Freshwater equivalent head calculated using TDS = SC * 0.65	Because of the importance of freshwater equivalent heads for determination of OPS and OF, use of the fixed 0.65 conversion factor can introduce error and uncertainty into calculation of fresh water equivalent heads. Suggest measuring specific gravity by field or laboratory method, and calculate freshwater equivalent head by reference density.	See above			As new data are collected, aquifer chemistry will change due to injection of foreign water. There may be outliers in the data (see examples below), and statistical correlations will shift, causing uncertainty and rendering historical data less useful. Below are examples of conversion factor slopes that might be affected by outlier data (in red circles).   Determination of TDS by residual on evaporation (ROE) would be the most representative method because other methods (i.e. lab sum of major ions) does not include metals and carbon. It is anticipated that samples from the groundwater remedy will have elevated	DTSC response: Tribal comment noted.

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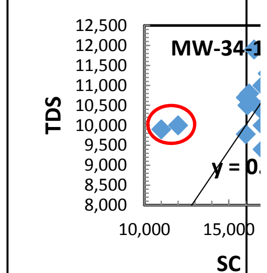
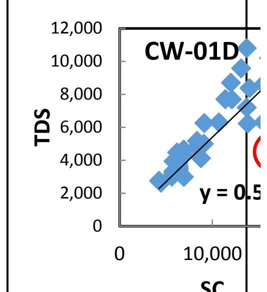
										concentrations of metals (Fe, Mn) and carbon.	
1106	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 3	Freshwater equivalent head calculated using TDS = SC * 0.65	Because of the importance of freshwater equivalent heads for determination of OPS and OF, use of the fixed 0.65 conversion factor can introduce error and uncertainty into calculation of fresh water equivalent heads. Suggest measuring specific gravity by field or laboratory method, and calculate freshwater equivalent head by reference density.	See above			As new data are collected, aquifer chemistry will change due to injection of foreign water. There may be outliers in the data (see examples below), and statistical correlations will shift, causing uncertainty and rendering historical data less useful. Below are examples of conversion factor slopes that might be affected by outlier data (in red circles).   Determination of TDS by residual on evaporation (ROE) would be the most representative method because other methods (i.e. lab sum of major ions) does not include metals and carbon. It is anticipated that samples from the groundwater remedy will have elevated concentrations of metals (Fe, Mn) and carbon.	DTSC response: Tribal comment noted.

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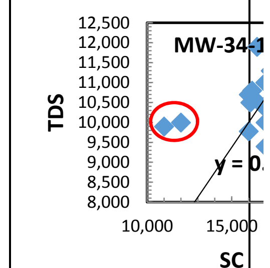
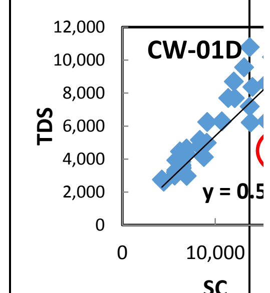
1107	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 3	Freshwater equivalent head calculated using TDS = SC * 0.65	Because of the importance of freshwater equivalent heads for determination of OPS and OF, use of the fixed 0.65 conversion factor can introduce error and uncertainty into calculation of fresh water equivalent heads. Suggest measuring specific gravity by field or laboratory method, and calculate freshwater equivalent head by reference density.	See above			As new data are collected, aquifer chemistry will change due to injection of foreign water. There may be outliers in the data (see examples below), and statistical correlations will shift, causing uncertainty and rendering historical data less useful. Below are examples of conversion factor slopes that might be affected by outlier data (in red circles).   Determination of TDS by residual on evaporation (ROE) would be the most representative method because other methods (i.e. lab sum of major ions) does not include metals and carbon. It is anticipated that samples from the groundwater remedy will have elevated concentrations of metals (Fe, Mn) and carbon.	DTSC response: Tribal comment noted.
1108	FMIT/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 5	Bottom of the well is the measurement	Because of the importance for determination of OPS and OF, fresh water equivalent head should be calculated from discretely screened intervals on a site-specific basis, and determination of freshwater equivalent heads from wells with fully-penetrating well screens should be avoided	PG&E currently calculates fresh water equivalent heads with			Groundwater contour maps in the 90% design and quarterly	DTSC response: Tribal comment noted. DTSC

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
					point	(Post, Kooi, and Simmons, 2007, Ground Water 45:6).	methods that address the concerns raised by this comment. Only discretely screened wells are used for freshwater equivalent head calculations. Fully-penetrating well screens are not used for freshwater equivalent head calculations, nor is this planned during the final remedy.			monitoring reports show data from older monitoring wells (e.g. MW-10, 14, 15, 16, 25, 26, etc.) that have single well screens. These wells need to be evaluated for their appropriateness in determining groundwater flow directions and velocities using freshwater equivalent head. Comment unresolved pending verification of the procedure within 100% design.	concurs that freshwater equivalent heads are an important and fundamental technical concept and will continue to be further evaluated (see RTC # 733 and 734) and may request further refinement to the conversion process.
1109	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 5	Bottom of the well is the measurement point	Because of the importance for determination of OPS and OF, fresh water equivalent head should be calculated from discretely screened intervals on a site-specific basis, and determination of freshwater equivalent heads from wells with fully-penetrating well screens should be avoided (Post, Kooi, and Simmons, 2007, Ground Water 45:6).	See above			Groundwater contour maps in the 90% design and quarterly monitoring reports show data from older monitoring wells (e.g. MW-10, 14, 15, 16, 25, 26, etc.) that have single well screens. These wells need to be evaluated for their appropriateness in determining groundwater flow directions and velocities using freshwater equivalent head. Comment unresolved pending verification of the procedure within 100% design.	DTSC response: See response to RTC #1108
1110	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 5	Bottom of the well is the measurement point	Because of the importance for determination of OPS and OF, fresh water equivalent head should be calculated from discretely screened intervals on a site-specific basis, and determination of freshwater equivalent heads from wells with fully-penetrating well screens should be avoided (Post, Kooi, and Simmons, 2007, Ground Water 45:6).	See above			Groundwater contour maps in the 90% design and quarterly monitoring reports show data from older monitoring wells (e.g. MW-10, 14, 15, 16, 25, 26, etc.) that have single well screens. These wells need to be evaluated for their appropriateness in determining groundwater flow directions and velocities using freshwater equivalent head. Comment unresolved pending verification of the procedure within	DTSC response: See response to RTC #1108

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										100% design.	
1111	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 5	Bottom of the well is the measurement point	Because of the importance for determination of OPS and OF, fresh water equivalent head should be calculated from discretely screened intervals on a site-specific basis, and determination of freshwater equivalent heads from wells with fully-penetrating well screens should be avoided (Post, Kooi, and Simmons, 2007, Ground Water 45:6).	See above			Groundwater contour maps in the 90% design and quarterly monitoring reports show data from older monitoring wells (e.g. MW-10, 14, 15, 16, 25, 26, etc.) that have single well screens. These wells need to be evaluated for their appropriateness in determining groundwater flow directions and velocities using freshwater equivalent head. Comment unresolved pending verification of the procedure within 100% design.	DTSC response: See response to RTC #1108
1112	FMIT/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 5	Correct Elev (ft AMSL) = Raw Elev + SalCorr + TempCorr	Because of the importance of corrected water-level measurements for determination of OPS and OF, incorporation of fixed conversion factors into this equation introduces error and uncertainty. Suggest using site-specific conversion factors.	As noted in RTC #1104 FMIT/TRC, to reduce potential errors associated with using the fixed conversion factor of 0.65 for the equation of TDS = SC * 0.65, PG&E will calculate a unique conversion factor for each well where sufficient laboratory TDS data are available.			Density is important for the Topock project. It is hopeful that the concept will be fully embraced and incorporated into every aspect of the groundwater remedy. Consider that increased density means higher pumping costs. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1113	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 5	Correct Elev (ft AMSL) = Raw Elev + SalCorr + TempCorr	Because of the importance of corrected water-level measurements for determination of OPS and OF, incorporation of fixed conversion factors into this equation introduces error and uncertainty. Suggest using site-specific conversion factors.	See above			Density is important for the Topock project. It is hopeful that the concept will be fully embraced and incorporated into every aspect of the groundwater remedy. Consider that increased density means higher pumping costs. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1114	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 5	Correct Elev (ft AMSL) = Raw Elev + SalCorr + TempCorr	Because of the importance of corrected water-level measurements for determination of OPS and OF, incorporation of fixed conversion factors into this equation introduces error and uncertainty. Suggest using site-specific conversion factors.	See above			Density is important for the Topock project. It is hopeful that the concept will be fully embraced and incorporated into every aspect of the groundwater remedy. Consider that increased	Comment resolved pending verification of the procedure within 100% design.

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										density means higher pumping costs. Comment resolved pending verification of the procedure within 100% design.	
1115	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B SOP-A22, p. 5	Correct Elev (ft AMSL) = Raw Elev + SalCorr + TempCorr	Because of the importance of corrected water-level measurements for determination of OPS and OF, incorporation of fixed conversion factors into this equation introduces error and uncertainty. Suggest using site-specific conversion factors.	See above			Density is important for the Topock project. It is hopeful that the concept will be fully embraced and incorporated into every aspect of the groundwater remedy. Consider that increased density means higher pumping costs. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1116	FMIT/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP- L01_rev3	CrVI analysis by Hach Method 1560	Because of the need for quality assurance and support of OPS and OF, reagent blanks must be analyzed using trace deionized water (DI), and the baseline value subtracted from instrument readings, especially for dilutions.	It should be noted that laboratory certified data for analytical parameters, rather than field data, will be used as needed for OPS determinations. When using colorimetric analysis such as CrVI analysis by HACH method 1560, it is important to use the sample (diluted if the sample needs dilution for the analysis) as the blank. Otherwise, any color associated with the native sample can cause significant interference and give a false positive reading. Using DI water would immediately bias the sample results. No changes proposed as a result of this comment.			Reviewer misunderstood the comment. Some reagents impart slight color or turbidity to the sample which is interpreted by the spectrophotometer as low concentration. Therefore, after zeroing the instrument on the sample blank, then run DI with reagent, and see if you get a reading baseline noise). That reading is then subtracted from all readings for the batch of analyses. Comment unresolved pending verification of the procedure within 100% design.	DTSC response: Tribal comment noted. PG&E response: The SOPs for analytes using HACH test kits address the issue of color or turbidity imparted from the reagents to the sample. For some analytes, this issue is addressed by filtering the post reaction sample prior to introducing it to the spectrophotometer. For others, the issue is addressed by analyzing a reagent blank to determine (by lot number) the effect of color and apply a correction factor, if needed, to all subsequent analyses done using that lot of reagent
1117	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP- L01_rev3	CrVI analysis by Hach Method 1560	Because of the need for quality assurance and support of OPS and OF, reagent blanks must be analyzed using trace deionized water (DI), and the baseline value subtracted from instrument readings, especially for dilutions.	See above			Reviewer misunderstood the comment. Some reagents impart slight color or turbidity to the sample which is interpreted by the spectrophotometer as low concentration. Therefore, after zeroing the instrument on the	See response 1116

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										sample blank, then run DI with reagent, and see if you get a reading (baseline noise). That reading is then subtracted from all readings for the batch of analyses. Comment unresolved pending verification of the procedure within 100% design.	
1118	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP- L01_rev3	CrVI analysis by Hach Method 1560	Because of the need for quality assurance and support of OPS and OF, reagent blanks must be analyzed using trace deionized water (DI), and the baseline value subtracted from instrument readings, especially for dilutions.	See above			Reviewer misunderstood the comment. Some reagents impart slight color or turbidity to the sample which is interpreted by the spectrophotometer as low concentration. Therefore, after zeroing the instrument on the sample blank, then run DI with reagent, and see if you get a reading (baseline noise). That reading is then subtracted from all readings for the batch of analyses. Comment unresolved pending verification of the procedure within 100% design.	See response 1116
1119	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP- L01_rev3	CrVI analysis by Hach Method 1560	Because of the need for quality assurance and support of OPS and OF, reagent blanks must be analyzed using trace deionized water (DI), and the baseline value subtracted from instrument readings, especially for dilutions.	See above			Reviewer misunderstood the comment. Some reagents impart slight color or turbidity to the sample which is interpreted by the spectrophotometer as low concentration. Therefore, after zeroing the instrument on the sample blank, then run DI with reagent, and see if you get a reading (baseline noise). That reading is then subtracted from all readings for the batch of analyses. Comment unresolved pending verification of the procedure within 100% design.	See response 1116
1120	FMIT/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP- L01_rev4	CrVI analysis by Hach Method 1561	Because of the need for quality assurance and support of OPS and OF, reagent lot number and expiration date need to be written down and recorded.	It should be noted that laboratory certified data for analytical parameters, rather than			The moment the water sample is collected, it starts to change; therefore, the sooner it	Comment resolved pending verification of the procedure within 100% design.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							field data, will be used as needed for OPS determinations. For the remedy, reagent lot number and expiration date will be recorded.			is analyzed, the better representation of actual conditions. Field analyses, when collected and analyzed carefully, are the most representative of actual conditions, especially with waters that change properties rapidly (e.g. IRZ and carbon injection areas). Field and laboratory analyses need to be performed and compared. Comment resolved pending verification of the procedure within 100% design.	DTSC response: Tribal comment noted.
1121	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP- L01_rev4	CrVI analysis by Hach Method 1561	Because of the need for quality assurance and support of OPS and OF, reagent lot number and expiration date need to be written down and recorded.	See above			The moment the water sample is collected, it starts to change; therefore, the sooner it is analyzed, the better. Field analyses, when collected and analyzed carefully, are the most representative of actual conditions, especially with waters that change properties rapidly (e.g. IRZ and carbon injection areas). Field and laboratory analyses need to be performed and compared. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design. DTSC response: Tribal comment noted.
1122	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP- L01_rev4	CrVI analysis by Hach Method 1561	Because of the need for quality assurance and support of OPS and OF, reagent lot number and expiration date need to be written down and recorded.	See above			The moment the water sample is collected, it starts to change; therefore, the sooner it is analyzed, the better. Field analyses, when collected and analyzed carefully, are the most representative of actual conditions, especially with waters that change properties rapidly (e.g. IRZ and carbon injection areas). Field and laboratory analyses need to be performed and compared. Comment resolved pending verification of	Comment resolved pending verification of the procedure within 100% design. DTSC response: Tribal comment noted.

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										the procedure within 100% design.	
1123	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP- L01_rev4	CrVI analysis by Hach Method 1561	Because of the need for quality assurance and support of OPS and OF, reagent lot number and expiration date need to be written down and recorded.	See above			The moment the water sample is collected, it starts to change; therefore, the sooner it is analyzed, the better. Field analyses, when collected and analyzed carefully, are the most representative of actual conditions, especially with waters that change properties rapidly (e.g. IRZ and carbon injection areas). Field and laboratory analyses need to be performed and compared. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design. DTSC response: Tribal comment noted.
1124	FMIT/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L04_rev01	Conductivity analysis	Because of the need for quality assurance and support of OPS and OF, the highest specific conductance standard shown is 15,000 us/cm, which is not high enough for the full range of SC values at the site.	It should be noted that laboratory certified data for analytical parameters, rather than field data, will be used as needed for OPS determinations. A standard in the general range of 25,000 – 45,000 us/cm will be used for calibration of the Hach sensION 378 Multiparameter Meter (or equivalent) whenever a sample with greater than 20,000 us/cm is to be analyzed. Text will be revised to add a stepped calibration procedure that includes calibration standards that cover the higher range of conductivity in some samples.			As with pH probes that have a "memory" of the fluid that was last measured or stored in, other probes similarly have memory of the last water measured. Therefore, recalibration is necessary when sampling sites with different water types within the same day. Time could be saved by dedicating field meters for low, medium, and high TDS conditions. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design. DTSC response: Tribal comment noted.
1125	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L04_rev01	Conductivity analysis	Because of the need for quality assurance and support of OPS and OF, the highest specific conductance standard shown is 15,000 us/cm, which is not high enough for the full range of SC values at the site.	See above			As with pH probes that have a "memory" of the fluid that was last measured or stored in, other probes similarly have memory of the last water measured. Therefore, recalibration is necessary when sampling sites with different water types within the same day.	Comment resolved pending verification of the procedure within 100% design. DTSC response: Tribal comment noted.

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										Time could be saved by dedicating field meters for low, medium, and high TDS conditions. Comment resolved pending verification of the procedure within 100% design.	
1126	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L04_rev01	Conductivity analysis	Because of the need for quality assurance and support of OPS and OF, the highest specific conductance standard shown is 15,000 us/cm, which is not high enough for the full range of SC values at the site.	See above			As with pH probes that have a "memory" of the fluid that was last measured or stored in, other probes similarly have memory of the last water measured. Therefore, recalibration is necessary when sampling sites with different water types within the same day. Time could be saved by dedicating field meters for low, medium, and high TDS conditions. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design. DTSC response: Tribal comment noted.
1127	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L04_rev01	Conductivity analysis	Because of the need for quality assurance and support of OPS and OF, the highest specific conductance standard shown is 15,000 us/cm, which is not high enough for the full range of SC values at the site.	See above			As with pH probes that have a "memory" of the fluid that was last measured or stored in, other probes similarly have memory of the last water measured. Therefore, recalibration is necessary when sampling sites with different water types within the same day. Time could be saved by dedicating field meters for low, medium, and high TDS conditions. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design. DTSC response: Tribal comment noted.
1128	FMIT/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L09_rev01	pH measurement	Because of the importance of pH to protect the organic rind, why are a stir bar and stirrer used for the pH measurement? This could cause streaming potential which affects the pH measurement, and can be avoided by pH measurement in quiescent water (Wilde and others, 2006, USGS TWRI Book 9, Chapter A6). Similarly, pH measurements in flow-through chambers can be affected by streaming potential.	See response to a similar comment, RTCs #1080 FMIT/TRC, #1081 Hualapai/TRC, #1082 Cocopah/TRC, #1083 Chemehuevi/TRC.			All waters are different, and a full understanding requires familiarity with the water and the field methods in order to achieve the highest quality data. While experimenting with different pH measurement methods that prove to be successful, SOP's can be updated as the project	DTSC Response: See response to a similar comment, RTCs #1080 FMIT/TRC, #1081 Hualapai/TRC, #1082 Cocopah/TRC, #1083 Chemehuevi/TRC.

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										progresses. Comment unresolved pending development of a plan to compare pH measurements in flowing and quiescent water.	
1129	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L09_rev01	pH measurement	Because of the importance of pH to protect the organic rind, why are a stir bar and stirrer used for the pH measurement? This could cause streaming potential which affects the pH measurement, and can be avoided by pH measurement in quiescent water (Wilde and others, 2006, USGS TWRI Book 9, Chapter A6). Similarly, pH measurements in flow-through chambers can be affected by streaming potential.	See above			All waters are different, and a full understanding requires familiarity with the water and the field methods in order to achieve the highest quality data. While experimenting with different pH measurement methods that prove to be successful, SOP's can be updated as the project progresses. Comment unresolved pending development of a plan to compare pH measurements in flowing and quiescent water.	DTSC Response: See RTC #1128 above.
1130	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L09_rev01	pH measurement	Because of the importance of pH to protect the organic rind, why are a stir bar and stirrer used for the pH measurement? This could cause streaming potential which affects the pH measurement, and can be avoided by pH measurement in quiescent water (Wilde and others, 2006, USGS TWRI Book 9, Chapter A6). Similarly, pH measurements in flow-through chambers can be affected by streaming potential.	See above			All waters are different, and a full understanding requires familiarity with the water and the field methods in order to achieve the highest quality data. While experimenting with different pH measurement methods that prove to be successful, SOP's can be updated as the project progresses. Comment unresolved pending development of a plan to compare pH measurements in flowing and quiescent water.	DTSC Response: See RTC #1128 above.
1131	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L09_rev01	pH measurement	Because of the importance of pH to protect the organic rind, why are a stir bar and stirrer used for the pH measurement? This could cause streaming potential which affects the pH measurement, and can be avoided by pH measurement in quiescent water (Wilde and others, 2006, USGS TWRI Book 9, Chapter A6). Similarly, pH measurements in flow-through chambers can be affected by streaming potential.	See above			All waters are different, and a full understanding requires familiarity with the water and the field methods in order to achieve the highest quality data. While experimenting with different pH measurement methods that prove to be successful, SOP's can be	DTSC Response: See RTC #1128 above.

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										updated as the project progresses. Comment unresolved pending development of a plan to compare pH measurements in flowing and quiescent water.	
1132	FMIT/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L13_rev00	Hach Nitrate analysis using NitraVer 5	Because of the importance of nitrate and support of OPS and OF, there are known interferences in the analytical method including chloride greater than 100 mg/L and all levels of ferric iron. Chloride concentrations in groundwater from the study area range from about 400 to over 13,000 mg/L. Calibration curves for high chloride concentrations can be prepared using standards with similar chloride ranges; however, corrections to the instrument readings are necessary. Onsite analyses of nitrate are important for monitoring the progress of COPCs at the site (e.g. selenium).	Nitrate analysis by Hach is at best a screening level analysis at this time. Because of the significant variation of the chloride concentrations, PG&E is working to develop multiple calibrations to achieve acceptable results. The SOP will be updated when the calibration results are available. It should be noted that laboratory certified data for analytical parameters, rather than field data, will be used as needed for OPS determinations.			NitraVer 5 reagent consists of a cadmium compound that is particularly harmful to human health and the environment. Care should be exercised when using these reagents. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1133	Hualapai/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L13_rev00	Hach Nitrate analysis using NitraVer 5	Because of the importance of nitrate and support of OPS and OF, there are known interferences in the analytical method including chloride greater than 100 mg/L and all levels of ferric iron. Chloride concentrations in groundwater from the study area range from about 400 to over 13,000 mg/L. Calibration curves for high chloride concentrations can be prepared using standards with similar chloride ranges; however, corrections to the instrument readings are necessary. Onsite analyses of nitrate are important for monitoring the progress of COPCs at the site (e.g. selenium).	See above			NitraVer 5 reagent consists of a cadmium compound that is particularly harmful to human health and the environment. Care should be exercised when using these reagents. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1134	Cocopah/TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L13_rev00	Hach Nitrate analysis using NitraVer 5	Because of the importance of nitrate and support of OPS and OF, there are known interferences in the analytical method including chloride greater than 100 mg/L and all levels of ferric iron. Chloride concentrations in groundwater from the study area range from about 400 to over 13,000 mg/L. Calibration curves for high chloride concentrations can be prepared using standards with similar chloride ranges; however, corrections to the instrument readings are necessary. Onsite analyses of nitrate are important for monitoring the progress of COPCs at the site (e.g. selenium).	See above			NitraVer 5 reagent consists of a cadmium compound that is particularly harmful to human health and the environment. Care should be exercised when using these reagents. Comment resolved pending verification of the procedure within 100% design.	Comment resolved pending verification of the procedure within 100% design.
1135	Chemehuevi/ TRC	Non-design	SOPs	C/RAWP Append B IM3-SOP-L13_rev00	Hach Nitrate analysis using NitraVer 5	Because of the importance of nitrate and support of OPS and OF, there are known interferences in the analytical method including chloride greater than 100 mg/L and all levels of ferric iron. Chloride concentrations in groundwater from the study area range from about 400 to over 13,000 mg/L. Calibration curves for high chloride concentrations can be prepared using standards with similar chloride ranges; however, corrections to the instrument readings are necessary. Onsite analyses of nitrate are important for monitoring the progress of COPCs at the site (e.g. selenium).	See above			NitraVer 5 reagent consists of a cadmium compound that is particularly harmful to human health and the environment. Care should be exercised when using these	Comment resolved pending verification of the procedure within 100% design.

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										reagents. Comment resolved pending verification of the procedure within 100% design.	
Specific Comments – Construction/Remedial Action Work Plan, Appendix C: PG&E Program Quality Assurance Project Plan											
1136	DOI-218	Non-design	Editorial	Approval Page	NA	Please include a signed approval sheet for the Final PQAPP.	A signed approval sheet for the Quality Assurance Project Plan will be included in the final design submittal		Resolved.		Comment resolved pending DOI review of the final design documents.
1137	DOI-219	Non-design	Editorial	1.2.4/1-3	All projects will begin by examining EPA's seven-step DQO process (EPA, 2000); based on the level of project complexity and intended use of the data, the level of detail and applicability of the seven-step process will be assessed.	Please state that the DQO process is documented in the SAP, or in this case, the Sampling and Monitoring Plan.	The PG&E Program QAPP (PQAPP) is an umbrella QAPP that covers multiple sites including Topock. The Addendum to the PQAPP for the Topock Groundwater Remedy is specific to the Topock groundwater remedy. Therefore, response to this comment will apply to the Addendum. Section 3.1 of the Addendum to the PQAPP for the Topock Groundwater Remedy will be revised to read (revisions shown as underline for addition and ~~strikeout~~ for deletion): "Sampling and monitoring activities are needed for compliance purposes and for effective operation and maintenance of the groundwater remedy. The rationale for the sampling design (sampling locations, frequency, and analytes) and the DQO process is documented in the O&M Manual, Volume 2, ~~is included in the~~ Sampling and Monitoring Plan"		Resolved.		Comment resolved.
1138	DOI-220	Non-design	Editorial	2.1/ 2-1	The PG&E Program management team has been structured with a program manager, program quality control manager,	Program Manager and Program Quality Control Manager are not titles that can be found in the C/RAWP Exhibit 2.1-1 or in C/RAWP Appendix A. Please edit accordingly.	The PG&E Program QAPP (PQAPP) is an umbrella QAPP that covers multiple sites including Topock. The Addendum to the PQAPP for the Topock Groundwater Remedy is specific to the Topock groundwater remedy.		Resolved.		Comment resolved.

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					program health and safety manger and a program chemist to ensure that the goals of the PG&E Program are met.		Therefore, response to this comment will apply to the Addendum. Section 2.1 of the Addendum to the PQAPP for the Topock Groundwater Remedy will be revised to read: "For information on project organization refer to the O&M Manual, Main Text Section L2, and the C/RAWP Section 2.1."				
1139	DOI-221	Non-design	Editorial	2.2/2-1	The organization chart and descriptive text identifying task managers and individuals charged with specific responsibilities for each project can be found in project-specific SAPs.	The cited information is actually found in the C/RAWP Section 2 and in Appendix A. Please edit accordingly.	The PG&E Program QAPP (PQAPP) is an umbrella QAPP that covers multiple sites including Topock. The Addendum to the PQAPP for the Topock Groundwater Remedy is specific to the Topock groundwater remedy. Therefore, response to this comment will apply to the Addendum. Section 2.1 of the Addendum to the PQAPP for the Topock Groundwater Remedy will be revised to read: "For information on project organization refer to the O&M Manual, Main Text Section L2, and the C/RAWP Section 2.1."		Resolved.		Comment resolved.
1140	DOI-222	Non-design	Editorial	2.3/2-1	All personnel engaged in field activities will have completed the Occupational Safety Health Administration, 40-hour health and safety training that meet the requirements of Title 29 Code of Federal Regulations Section 1910.120 and	Please indicate who at PG&E is responsible for ensuring training requirements are satisfied and where training certification documentation is maintained.	The PG&E Program QAPP (PQAPP) is an umbrella QAPP that covers multiple sites including Topock. The Addendum to the PQAPP for the Topock Groundwater Remedy is specific to the Topock groundwater remedy. Therefore, response to this comment will apply to the Addendum. The following sentence will be added to Section 5 of the Addendum to the PAQPP for the Topock Groundwater Remedy:		Resolved.		Comment resolved.

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					Title 8 Code of California Regulations Section 5192. All CH2M HILL personnel working on the PG&E Program will read applicable project-specific health and safety plans. Documentation will be maintained to demonstrate that all requirements of the plan are followed.		"The PG&E Construction Manager, or designee, is responsible for ensuring that training and certification requirements of the QAPP are satisfied. The CHQ will serve as the primary repository for records during construction."				
Specific Comments – Construction/Remedial Action Work Plan, Appendix D: Construction Health and Safety Plan											
1141	DOI-223	Non-design	Other	7.4/7-5		This section of the HASP should include a discussion of the spill containment program implemented for the project and reference SOPs pertaining to spill containment and controls. Protocol for notification of releases of hazardous substances or hazardous materials should also be discussed or referenced.	Section 7.4 of the HASP will be revised as follows: <u>7.4.7 Spill Containment</u> <u>7.4.7.1 Fuel Handling</u> <u>During construction activities, there is a potential for spills of fuel during fueling operations for construction equipment. The policy for safe fueling and fuel handling are similar to those that are provided in Remedy Standard Operating Procedure (SOP) -01. Remedy-SOP-01 can be found in Appendix A, Sampling and Monitoring Plan, Operation and Maintenance Manual Volume 2 (CH2M Hill, 2014). In the event of a spill, the PG&E Site Operations Manager/Sr. Environmental Inspector must be notified immediately.</u> <u>7.4.7.2 Well Installation</u> <u>During well installation, there is a potential for spills of liquids used for well drilling and well development. The</u>		Resolved.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							procedures for spill prevention, containment, and control to be used during well installation are similar to those that must be used for monitoring well development, purging, and sampling. Those procedures are provided in SOP-A13. SOP-A13 can be found in Appendix A, Sampling and Monitoring Plan, Operation and Maintenance Manual Volume 2 (CH2M Hill, 2014). In the event of a spill, the PG&E Site Operations Manager/Sr. Environmental Inspector must be notified immediately. 7.4.7.3 Hazardous Waste Should any hazardous waste (including contaminated soil) be spilled, the procedures for spill reporting and response outlined in the Sections 4.7 and 4.8 of the Soil Management Plan, Operation and Maintenance Manual Volume 4 (CH2M Hill, 2014), will be followed.				
1142	DOI-224	Non-design	Other	7.5/7-9		Only Level D and Level C PPE are described in this section. An introduction to the anticipated PPE levels should be provided in the beginning of this section	Section 7.5 of the HASP will be revised as follows: 7.5 Personal Protective Equipment Based on an evaluation of the hazards of the site, personal protective equipment (PPE) will be required for all personnel and visitors entering the controlled portion of the site. It is anticipated that PPE requirements will be limited to Level D or Level C protection. It is not anticipated that either Level B or Level A PPE will be required. However, if field		Resolved.		Comment resolved.

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							conditions or site monitoring indicate that a higher level (greater protection) of PPE is required, such work will be temporary halted, and the program will be further evaluated and modified as deemed appropriate. PPE for each level of protection is described in general below. Note that specific tasks, including (but not limited to) work at the Compressor Station, elevated/suspended work, or high-voltage electrical work will require additional PPE.				
Specific Comments – Construction/Remedial Action Work Plan, Appendix E: Cost Estimate (Comments on this Appendix are combined with those on 90% BOD Section 8 and Appendix H as they are the same cost estimate)											
Specific Comments – Construction/Remedial Action Work Plan, Appendix F: IM3 Decommissioning, Removal, and Restoration Work Plan											
1143	DOI-228	Non-design	Editorial		Appendix B IM-3 Decommissioning Plan	The cover sheet for this appendix inappropriately identifies it as Appendix B. Please correct this to read "Appendix F".	The cover sheet for this appendix will be revised.		Resolved.		Comment resolved.
1144	DOI-229	Non-design	Editorial	Acronyms and Abbreviations/ ix-xi		Please include the following: PAMP - perimeter air monitoring plan AMO - Air Monitoring Officer	The acronyms PAMP and AMO will be added to the acronyms page		Resolved.		Comment resolved.
1145	DOI-230	Non-design	Editorial	1.1/1-1	The lay-up period will end, and the decommissioning, removal, and restoration work will begin after agency approval is received.	Please add at the end of this sentence "that the Final Remedy has achieved plume control and is operating properly and successfully in accordance with the 2012 Settlement Agreement between DTSC and the FMIT."	PG&E suggests potential edits to DOI's added sentence: ".. and that the ~~Final~~ groundwater ~~R~~remedy has achieved plume control and is operating properly and successfully in accordance with the 2012 Settlement Agreement between DTSC and the FMIT (see Section 1.2.2 for details)."		Resolved.		Comment resolved.
1146	DOI-231	Non-design	Legal	1.2.1/1-2	The IM-3 system is not part of the selected Final Remedy; therefore, the IM-3 system will be decommissioned and removed after DOI and DTSC determine that the Final Remedy is	DTSC has the legal obligation to determine whether the remedy is operating properly and successfully. Once that determination is made, DOI will provide concurrence on their determination and the decommissioning can proceed in accordance with the approved work plan.	The sentence will be revised to read: "The IM-3 system is not part of the selected Final Remedy; therefore, the IM-3 system will be decommissioned and removed after ~~DOI and~~ DTSC determine[s] that the Final Remedy is operating properly and successfully and DOI provides concurrence on DTSC's determination."		Resolved.		Comment resolved.

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					operating properly and successfully.						
1147	DOI-232	Non-design	Editorial	2.1/2-2	Treat the liquid contents (brine from Step 6 and process/cleaning water from Steps 7 & 8) of the brine storage tanks by either injecting the liquid contents into the in situ system, transporting the liquid contents to the TCS evaporation ponds, or arranging for offsite disposal to a permitted offsite facility(ies)	It seems that the first option of injecting the waste into the in situ system is not prudent if the waste is mostly brine because of the potential negative effects on the in situ microbial population. Please consider qualifying the use of this option when salinity is below a prescribed upper tolerance of the in situ salinity.	Bullet #10 will be revised as follows: "The liquid contents of the brine storage tanks which include brine rinsate from Steps 8 & 9 will be tested to determine which of the following is the appropriate liquid management approach 1) injecting the liquid contents into the in situ system, 2) transporting the liquid contents to the TCS evaporation ponds, or 3) arranging for offsite disposal to a permitted offsite facility(ies). <u>The selection of an option will be affected by the quality of the water (e.g., effects of salinity on in situ microbial population) and regulatory requirements.</u> The most appropriate option will be selected and performed. Using the brine system rinsate in the remedy will only be considered if appropriate for use in the remedy and approval from the Regional Water Quality Control Board's through the Waste Discharge Requirements permit allowing such use." The following sentence will be added to the end of Bullet #7: "<u>The brine will then be hauled offsite to a permitted facility.</u>"		Resolved.		Comment resolved.
1148	DOI-233	Non-design	Other	2.1/2-3	Laboratory waste will be managed in accordance with state and federal regulations.	Please provide further detail regarding the expected waste stream generated from the lab. Laboratory waste should also be identified in Section 5.	Under current operations the IM3 laboratory generates two waste streams. 1) Solids which consist of used/disposable - polypropylene pipette tips, gloves, empty foil reagent powder pillows, empty sample		Resolved.		Comment resolved.

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							containers (polypropylene or glass) and used paper towels which are dealt with as non-hazardous solid waste. 2) Liquid – Waste water (Wash water, samples, analytical waste) is poured into the lab sink that drains to a tank that is then transferred to the treatment system and treated by the system prior to injection. Currently no hazardous waste is produced in the IM3 laboratory. The two waste streams generated are managed real-time during operations and no additional lab wastes would be generated during layup or demolition that are additional to the categories of waste identified in Section 5. Section 2.1, item #24 will be revised as follows: "24. Verify lab equipment is clean and the laboratory is left in a clean and safe condition. ~~Laboratory waste will be managed in accordance with state and federal regulations."~~				
1149	DOI-234	Non-design	Editorial	3.2.2.2/3-3	Workers leaving the exclusion zones will go through decontamination in the contaminant reduction zones consisting of boot washes, PPE removal areas, personal decontamination, and clean clothing area.	The only decontamination zone is at the entrance to the IM-3 facility. The equipment and piping at this facility has been cleaned and rinsed during layup. Although decontamination is a standard practice at a remediation site, this seems inappropriate for decommissioning the IM-3 facility. Please clarify.	The layup activities will remove the majority of the chromium remaining in the IM-3 system, but not all of it. Each of the components will be cleaned as described in Section 4, thus requiring work zones. The following text will be added to Section 3.2.2 after the 9th line: "Contaminant reduction zones are shown only at the iM-3 Treatment Facility on Figure 3-2. The project manager will establish contaminant reduction zones for other areas including the		Resolved.		Comment resolved.

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							MW-20 Bench and along the extraction pipelines as needed to facilitate decommissioning activities and protect worker and public safety. The following sentence will be added to Figures 3-2 to 3-6 as new notes: Contaminant reduction zones will be established as needed in the field by the project manager in accordance with the approved Work Plan.				
1150	JDS-2	Design	Remedial Design	Appendix F; Figure 3-5	Notes 4, 5, 6	The pipe down the slope and under the wash should be removed. IM-3 restoration should address post removal restoration of wash and slope.	There are four water pipes and several conduits in a shared trench under Bat Cave Wash. PG&E intends to abandon these pipes and conduits in place (after cleaning) to avoid disturbance to sensitive habitats in the wash. PG&E recognizes that FMIT as a landowner may have a preference to remove the pipes/conduits. PG&E will discuss this issue with FMIT prior to decommissioning, as part of its development of the final, detailed restoration plan.	PG&E has committed to removing all subsurface infrastructures for remedy to the extent practicable. IM3 should not differ. See PG&E response to comment 8.		Tribe agrees that IM3 should not differ.	DTSC response: Tribal comment noted. PG&E will discuss infrastructure removal with the landowner prior to decommissioning and during the development of the restoration plan.
1151	JDS-3	Design	Remedial Design	Appendix F; Figure 3-6	Notes 2 and 3	The pipe down the slope should be removed. IM-3 restoration should address post removal restoration of slope.	There are 4 conduits and 1 water pipe buried in the steep slope. PG&E intends to abandon the pipe/conduits in place (after cleaning) to minimize soil disturbance, control erosion, and improve safety for workers on the slope. Removing the pipe would increase the volume of earthwork on the project by approximately 30 cubic yards. In addition, pipe removal would disturb the ground surface and nearby biological resources, and potentially create a preferential flow paths that would increase erosion. Finally, working	PG&E has committed to removing all subsurface infrastructures for remedy to the extent practicable. IM3 should not differ. See PG&E response to comment 8.		Tribe agrees that IM3 should not differ.	DTSC/DOI response: The Agencies will provide direction to PG&E. Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							on steep slopes is inherently risky to construction workers. PG&E recognizes that BLM as a land manager and is committed to discussing decommissioning practicality at the time of decommissioning.				
1152	DOI-235	Non-design	Other	4.1.1.2/4-3	In accordance with the California Well Standards, filler material will not be used to decommission IM-3 system wells because they are located in an area of contaminated soil and groundwater; however, this assumption will be confirmed with DTSC, DOI, responsible agency (San Bernardino County), affected land owner, Tribes, and other stakeholders before backfilling the wells.	The discussions should occur now and the decision should be made regarding filler material during comment resolution and included in the final design package for approval.	PG&E assumes that the decision as to whether filler material can be used to decommission all or a subset of the listed wells (TW-2S, TW-2D, TW-3D, PE-1, IW-2, and IW-3) cannot be made until the time of permitting (with San Bernardino County) and decommissioning since it will depend on whether or not the wells are located in an area of contaminated soil and groundwater. Currently the listed wells with the exception of IW-2 and IW-3 are located within the contaminated groundwater plume and on the flood plain of the Colorado River, which represents an area of increased potential for surface water infiltration relative to nearby uplands. It is also understood that IW-2 and IW-3 could be considered in the area of the groundwater plume. Based on this PG&E would anticipate that filler material would not be used to decommission these wells, and that sealing material would be used to seal the well casing from total depth. PG&E will revise the document accordingly unless otherwise directed by the agencies.	Although decommissioning of these wells can be planned for the future and included in the IM3 Decommissioning plan, DTSC is concerned that the wells identified may have potential to be utilized as part of the remedy. For example, the TW wells are located in a contaminated portion of the plume near the IRZ line in close vicinity to a provisional IRZ well. The decision to decommission these wells should be evaluated on a case by case basis when understanding of the subsurface hydraulics is gained after the operational capabilities of the remedy are defined. If decommissioned prematurely, PG&E may have to drill new wells in the same vicinity if deemed technically necessary for the remedy.	Resolved.		Comment resolved.
1153	DOI-236	Non-design	Editorial	4.3.6/4-7	The pipe culvert on the road at Bat Cave Wash will be preserved.	The current plan is to remove the pipe culvert. Please revise accordingly.	In response to 90% comments (see RTC #19 FMIT-5) and subject to concurrence from agencies, the crossing design would be		Resolved.		Comment resolved.

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Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							changed to direct bury pipes/conduits in BCW. The existing access road and pipe culvert will remain unchanged.				
1154	DOI-237	Non-design	Editorial	4.3.8/4-12	The handling and disposition of displaced material will be in accordance with Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California (see Appendix F).	Appendix F is entitled "Soil Management Plan". Please revise accordingly.	The sentence will be revised to read: "The handling and disposition of displaced material will be in accordance with [the Soil Management Plan] ~~*Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California*~~ (see Appendix F)."		Resolved.		Comment resolved.
1155	DOI-238	Non-design	Editorial	Figure 4-1		Please include a legend within this figure that provides descriptions of the waste streams for the grey, light blue and orange sections of the diagram. Also identify the difference between the purple and black arrows.	The figure was revised to include a legend; the revised figure is included in **Attachment Z** of the final RTC table.		Resolved.		Comment resolved.
1156	DOI-239	Non-design	Other	5.1.2.2/5-2		All concrete/asphalt sampling, including in situ sampling, shall be biased toward visible staining.	The second sentence in Section 5.1.2.2 will be revised as follows: "Samples will be collected from locations most likely to have contacted hazardous waste or hazardous materials, such as the inside containment structures for process chemicals and other containment areas exposed to treatment system sludge <u>as well as visually stained areas</u>."		Resolved.		Comment resolved.
1157	DOI-240	Non-design	Editorial	5.1.2.2/5-2	Representative samples of concrete from the plant foundations, floor slabs, vaults, and containment areas will be collected by chipping or coring.	An SOP needs to be prepared for sampling concrete. The depth of penetration of chipping or coring should be representative of the contamination penetration depth so as to not dilute the contamination with underlying non-contaminated material. Although a core through the entire floor slab may seem to be more representative of the debris disposed in a landfill or possibly reused, it is water contact with the surface contaminated material that results in leaching of contaminants.	Sampling and analysis of the stained portion of the concrete is appropriate to determine the nature and magnitude of the contaminants in the stained area. It will be assumed that this sampling for waste classification purposes represents the entire mass of concrete that is being disposed (unless the contaminated		Resolved.		Comment resolved.

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							surface is removed) or otherwise specified by the waste disposal facility. An SOP was prepared for this activity in response to the comment (see **Attachment AA** of the final RTC table).				
1158	DOI-241	Non-design	Editorial	5.1.2.3/5-2	…and soil and waste in cracks, crevices, and pits may be present	The word "be" should be "have been". Please revise.	The language "may be present" is the same as the language in 22 CCR 7383(e)(2).		Resolved.		Comment resolved.
1159	DOI-242	Non-design	Legal	5.1.5/5-5	PG&E proposes use of the following potential disposal facilities for the project as well as others, subject to the communication and approval processes under the Consent Decree outlined above: …	At the time of this writing (12/2014), discussions with EPA Region 9 indicate that the following facilities are approved to receive CERCLA waste: (1) CWM Kettleman Hills (2) US Ecology, NV (3) Clean Harbors, Buttonwillow. Please remove PSC Rancho Cordova from consideration for disposal of CERCLA waste at this time.	The PSC Rancho Cordova facility will be removed from Section 5.1.5.		Accepted.		Comment resolved pending DOI review of the final design documents.
1160	DOI-243	Non-design	Editorial	7.2.1/7-1	The results of the XRF screening will be screened against Topock Specific Background Values (if available), and residential screening levels (screening levels).	Please provide some discussion as to the accuracy/precision of XRF to quantitate metal concentrations at background or residential screening levels.	The following sentence will be added to the end of the Step 1 paragraph in Section 7.2.1: XRF samples will be analyzed for metals in accordance with Standard Operating Procedure (SOP)-B16, *Field-portable X-Ray Fluorescence Soil Sampling*. The XRF SOP describes the calibration process and how to achieve better detection levels (i.e., homogenization of the sample, longer exposure time, and using two or more scan frequencies). In addition, XRF concentrations will be adjusted using linear least square fit equations calculated from the RCRA facility investigation/remedial investigation samples analyzed in the		Resolved.		Comment resolved.

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							laboratory and by the XRF. The Standard Operating Procedure (SOP)-B16, *Field-portable X-Ray Fluorescence Soil Sampling* is included in Appendix F (Soil Management Plan, Appendix A, Attachment 1)				
1161	DOI-244	Non-design	Editorial	7.2.1/7-2	If XRF metal results exceed applicable screening levels, an additional soil sample will be collected at the same location as the XRF screening location and sent to an offsite laboratory for analysis. If none of the XRF screening samples exceed screening levels, additional soil samples will be collected at the XRF screening locations in operational areas or areas where known releases occurred within each AOC.	The use of the word "additional" is a little confusing and could be deleted for clarity. If XRF results are negative, will soil samples be collected randomly in the operation area (i.e., random selection of grids within the area)? Please clarify. Are there known releases at these AOCs? If not, this statement should be deleted. If so, biased samples should be collected at these locations and 10 random samples be collected outside these locations.	Spills have occurred and have been cleaned up at AOCs 29 and 30. These spills and clean ups are outlined in the Addendum to RCRA Facility Investigation/Remedial Investigation Report, Volume 1 (CH2M HILL, 2014). The text in has been revised as follows: "Step 2 Offsite Laboratory Analysis: If XRF metal results exceed applicable screening levels, <u>a</u> ~~an additional~~ soil sample will be collected at the same location as the XRF screening location and sent to an offsite laboratory for analysis. If none of the XRF screening samples exceed screening levels, ~~additional~~ soil samples will be collected at the XRF screening locations in operational areas <u>or biased to those grid spaces</u> ~~areas~~ where known releases occurred within each AOC. A minimum of 10 soil samples will be collected at each AOC to obtain sufficient data to satisfy the Soil RFI/RI Investigation Data Quality Objectives. Agencies will be notified prior to implementation."		Resolved.		Comment resolved.
1162	DOI-245	Non-design	Editorial	7.3/7-2	If confirmation results are above the site-specific background	There are only three samples each at the injection wells and the MW-20 bench, and only one sample at PE-1. The UCL cannot be calculated at PE-1, and the conclusion drawn from comparison of the calculated UCL to the target level at the other two locations would have considerable uncertainty. Suggest deleting the UCL calculation for this application.	A minimum of 10 soil samples will be collected at each AOC, so there will be sufficient data to calculate the UCL for		Resolved.		Comment resolved.

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					values, then an area-wide average concentration will be calculated as the 95th percent upper confidence limit of the mean, using ProUCL Version 4.0 software (USEPA, 2007). If area-wide average concentrations are below the site-specific background values, then no further evaluation is necessary.		these AOCs. Sample locations outside of the AOCs, including the baseline soil data from along the pipeline alignments, the vaults associated with the injection wells (IW-02 and IW-03) and the injection well support structure in the East Mesa will initially be compared on a point-by-point comparison. If concentrations from these samples are above site-specific background values, a hotspot analysis will be conducted. Any hotspots will be evaluated separately. If no hotspots are identified then the areas located outside of the AOC boundaries will be treated as one area and all of these data will be combined to calculate the area-wide average. The third sentence in the last paragraph in Section 7.3 has been revised as follows: "If confirmation results are above the site-specific background values, <u>a hotspot analysis will be conducted; any hotspots will be evaluated separately. If no hotspots are identified</u> then <u>the areas outside of the AOC boundaries will be treated as one area and will include data from the baseline sampling along the pipeline alignments, the vaults associated with the injection wells, and the injection well support structure in East Mesa. These data will be combined and</u> an area-wide average concentration will be calculated as the 95th percent upper				

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							confidence limit of the mean, using ProUCL Version 4.0 software (USEPA, 2007)."				
1163	DOI-246	Non-design	Editorial	9.2/9-2	A biological evaluation will be performed to outline the IM-3 decommissioning, removal, and restoration activities as they relate to federally listed species in the area. The USFWS issued a concurrence letter on July 7, 2014 for the Final Remedy Programmatic Biological Assessment (PBA) which addressed a variety of activities, including activities identified in this Work Plan. The intent of the PBA is to provide programmatic coverage of these actions and avoid the need for individual project-specific consultations under the federal ESA.	Revise text as follows: PG&E will outline how the IM-3 decommissioning, removal, and restoration activities will affect federally listed species in the area. Since the USFWS issued a concurrence letter on July 7, 2014 for the Final Remedy Programmatic Biological Assessment (PBA) which addressed a variety of activities, including activities identified in this Work Plan, a new, separate consultation may not be necessary. The intent of the PBA was to provide programmatic coverage of all groundwater remedial actions and avoid the need for individual project-specific consultations under the federal ESA. However, if PG&E determines that the PBA needs to be updated or that a separate, individual consultation on the IM-3 decommissioning is necessary, they will work with the BLM and the USFWS to address additional impacts to federally listed species.	PG&E believes that the 2014 PBA adequately addresses the IM-3 Decommissioning and Restoration activities. For that reason, minor text changes for the proposed rewrite are suggested, as follows: "~~A biological evaluation will be performed to outline~~ PG&E will outline how the IM-3 decommissioning, removal, and restoration activities [will affect] ~~as they relate to~~ federally listed species in the area. Since the USFWS issued a concurrence letter on July 7, 2014 for the Final Remedy Programmatic Biological Assessment (PBA) which addressed a variety of activities, including activities identified in this Work Plan, a new, separate consultation is not anticipated]. The intent of the PBA ~~is~~ was to provide programmatic coverage of ~~these actions~~ all groundwater remedial actions and avoid the need for individual project-specific consultations under the federal ESA. However, should PG&E determine that the PBA needs to be updated or that a separate, individual consultation on the IM-3 decommissioning is necessary, then they will work with the BLM and the USFWS to address additional impacts to federally listed species."		Resolved.		Comment resolved.
1164	JDS-9	Non-design	Editorial	Appendix F; Figure 9-1		On page 1 of the schedule please move schedule over so that we can see the beginning of Year 1; activities A1010 through A2090 cannot be viewed.	Appendix F to the IM-3 Decommissioning Plan is the Soil Management Plan Presumably this comment refers to Appendix F to the			Noted.	

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							C/RAWP which is the IM-3 Decommissioning Plan. Figure 9-1 will be revised to view the initial activities				
1165	DOI-247	Non-design	Editorial	Appendix B, Section 2		It is not clear if the organization is entirely the Owner or is Owner and Contractor. Please clarify. If all positions are those of the Owner, what are the QC requirements for the Contractor? Lastly, please provide a brief synopsis of the Project Team member responsibilities.	It is Owner and Contractor. A brief description of the responsibilities will be provided as requested.		Accepted.		Comment resolved pending DOI review of the final design documents.
1166	DOI-248	Non-design	Editorial	Appendix B 3.4/3-1	The Project QC Manager, Construction Manager (CM), other project management personnel, and PG&E representatives will attend this inspection.	The CM is not listed as a team member in Section 2.1.1. Please clarify and edit appropriately.	The Demolition PM is same as the Construction Manager. For clarity, the term Demolition PM will be changed to Construction Manager in this Appendix.		Resolved.		Comment resolved.
1167	JDS-10	Non-design	Editorial	Appendix F; Appendix B – Decommissioning Quality Assurance and Control Plan	3.4 Final Acceptance Inspection	Unclear about the statement.... Notice should be given to PG&E at least 14 days before Final. Since PG&E will schedule the final inspection. Clarify to indicate that land owners, land managers will be given at least 14 days notice prior to Final.	The sentence will be clarified as requested. The last sentence will be clarified to state that inspection will be considered closed when the work has been accepted by land owners, land managers, and regulatory agencies.			Noted.	
1168	JDS-11	Non-design	Editorial	Appendix M; Figure 1-3	Best Management Practices	Erosion Control IM-3 should be updated with based on updated staging areas and work areas presented in the decommissioning plan based on Tribal input	Please see RTCs #860 FMIT/RTC, #861 Hualapai/RTC, #862 Cocopah/TRC, and #863 Chemehuevi/TRC for responses to comments on staging areas.			Noted.	
Specific Comments – Construction/Remedial Action Work Plan, Appendix G: Havasu National Wildlife Refuge, Habitat Restoration Plan											
1169	DOI-249	Non-design	Other	Havasu National Wildlife Refuge, Habitat Restoration Plan, page 2-16	An estimate of 0.787 acres will be impacted by the groundwater remedy construction, operation, and maintenance activities.	Please add 0.787 acres of habitat on the Havasu NWR to include as potential revegetation sites.	Table 1 represented the preliminary plant impact assessment for HNWR and included all mapped plants. There will only be trimming on two mesquite plants; taking of all other whole trees can be avoided. The table footnote indicates that the boldface entries are the only plants that will be transplanted or replaced and the total acreage for just those items is 0.034 acres. While it is recognized that, ultimately, the entire construction footprint on HNWR land will be subject to		Resolved.		Comment resolved.

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							revegetation/ restoration, that process will occur primarily in the final phase of the project after operation, decommissioning, and removal of the groundwater remedy facilities. If there are portions of the construction footprint that can be re-planted in the interim, they will be.				
Specific Comments – Construction/Remedial Action Work Plan, Appendix L: Soil Management Plan (Combined comments with 90% BOD, Appendix L O&M Manual Volume 4: Soil Management Plan as this is the same plan)											
Specific Comments – Construction/Remedial Action Work Plan, Appendix M: Best Management Practices Plan											
1170	DOI-250	Non-design	Editorial	General Comment		Please ensure changes made to the Soil Management Plan are carried over into Section 1.3 for consistency.	Changes made to the Soil Management Plan will be carried over into the BMP Plan		Resolved.		Comment resolved pending DOI review of the final design documents.
1171	DOI-251	Non-design	Editorial	1.1.1/8	Existing vegetation preserved whenever feasible during clearing and grubbing or other soil-disturbing activities.	This sentence is incomplete. Please revise the text accordingly.	The sentence will be revised to read: "Existing vegetation <u>will be</u> preserved whenever feasible during clearing and grubbing or other soil-disturbing activities."		Resolved.		Comment resolved.
1172	DOI-252	Non-design	Other	1.1.1/8	In the event that existing vegetation needs to be disturbed, areas that need to be preserved will be marked with temporary fencing.	It is unclear from the text how it will be determined if areas "need to be preserved". Please expand on the text or reference other documents.	The sentence will be revised to state: "In the event that existing vegetation needs to be disturbed, areas that need to be preserved will be <u>identified by a qualified biologist consistent with Section 4.2.3 of the C/RAWP and</u> marked with temporary fencing. Employees and subcontractors will be informed of the limits of disturbance within the construction site and will be instructed to keep clear of delineated areas."		Resolved.		Comment resolved.
1173	DOI-253	Non-design	Other	1.1.3/8	During road preparation activities, loose sediment will be uniformly compacted, consistent with the substantive San Bernardino County Building and Land Use	Road preparation should also include measures for reducing water erosion (e.g., clearing ditches and culverts of debris).	The second sentence in Section 1.1.3 will be revised as follows: "Ongoing road maintenance—(1) visual inspections to identify areas of erosion, (2) localized road repair and regrading, installation, and maintenance of erosion control features		Resolved.		Comment resolved.

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					Services Department requirements, to aid in reducing wind erosion.		such as berms, silt fences, or straw wattles, ~~and~~ (3) grading for road smoothness, and (4) measures to reduce water erosion such as clearing ditches and culverts of debris —will be performed as needed to reduce potential for erosion."				
1174	DOI-254	Non-design	Editorial	1.3.1/9	Unless characterized as non-hazardous waste.	This sentence is incomplete. Please revise the text accordingly (presumably part of the previous sentence).	The third sentence in Section 1.3.2 will be revised to read: "Leaks and spills will be cleaned up immediately using proper absorbent materials, which will then be disposed of as hazardous waste, unless characterized as non-hazardous waste."		Resolved.		Comment resolved.
1175	DOI-255	Non-design	Other	1.3.4/11	Spills will be covered and protected from stormwater runon during rainfall and will not be buried or washed with water.	The intent of this sentence is unclear. Spills should immediately be cleanup up to the extent possible, even during storm events. The practice of covering spills should be implemented only in rare cases where immediate cleanup is not possible. Further detail should be provided on prohibited practices for spills.	The sentence will be revised to state "Leaks and spills will be immediately cleaned up to the extent possible using absorbent materials, which will then be disposed of properly. Leaks and spills shall not be covered and/or buried or washed with water. ~~Spills will be covered and protected from storm water run on during rainfall and will not be buried or washed with water. Spills will be contained and cleaned up immediately and thoroughly."~~		Resolved.		Comment resolved.
1176	DOI-256	Non-design	Editorial	1.3.7/11	The sanitation subcontractor will monitor onsite sanitary/septic waste storage and disposal procedures weekly basis accordance with the sanitary/septic waste management BMPs.	This sentence is incomplete. Please revise the text accordingly.	The sentence will be revised to read: "The sanitation subcontractor will monitor onsite sanitary/septic waste storage and disposal procedures on a weekly basis in accordance with the sanitary/septic waste management BMPs.		Resolved.		Comment resolved.
1177	DOI-257	Non-design	Other	1.6.4/13	Illicit connections are connections of	It should be clarified that illicit connections are connections that could convey anything not composed entirely of surface and storm water directly to the storm drainage system or a water body.	The sentence will be revised to state: "Illicit connections are		Resolved.		Comment resolved.

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					the sanitary sewers to the storm sewer system.		connections ~~of the sanitary sewers to the storm sewer system~~ that could convey anything not composed entirely of surface and storm water directly to the storm drainage system or a water body or are illegally dumped."				
1178	DOI-258	Non-design	Other	2.1/14	If an inspection day (except those required relative to a rainfall event) falls on a Saturday or holiday, the inspection may be conducted on the preceding workday.	This section deals specifically with rain events therefore it is unclear under which situation the statement would apply. It is also unclear when an inspection would occur if a rain event occurs during a long holiday weekend.	The sentence will be revised to state: "Rain event inspections shall occur during working hours when it is safe to do so ~~are only required during the normal working hours~~. In the event of rain over a weekend or during a long holiday the inspection can occur prior to or after the weekend. ~~If an inspection day (except those required relative to a rainfall event) falls on a Saturday or holiday, the inspection may be conducted on the preceding workday.~~		Resolved.		Comment resolved.
1179	DOI-259	Non-design	Editorial	Figure 1-2/18	EROSION CONTROAL	Correct to: EROSION CONTROL	The title of Figure 1-2 will be corrected.		Resolved.		Comment resolved.
Specific Comments – Construction/Remedial Action Work Plan, Appendix Q: Site Security Plan											
1180	DOI-260	Non-design	Other	1.2/1-2	PG&E's security standards for remedial facilities at Moabi Regional Park will be established after the design is firmed up.	Please provide security standards for remedial facilities at Moabi Regional Park.	The cited text will be expanded to read: "~~PG&E's~~ Security ~~standards~~ features for remedial facilities at Moabi Regional Park ~~will be established after the design is firmed up~~ includes, but not limited to the following: • Perimeter fencing with gates equipped with chains and locks. Vehicle entrance to certain areas may have sliding/ motorized gate with keypad/card reader entry. • Security alarm system (not connected to the Compressor Station).		Resolved.		Comment resolved.

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							• Security/yard lighting. • Closed-circuit security camera mounted to monitor entry to certain locations."				
1181	DOI-261	Non-design	Editorial	2.3/2-3	Identified disturbances will be reported to DTSC and the respective landowner.	Please include the DOI PM in the notification of identified disturbances.	The DOI PM will be added to the Notification and Reporting section of the Site Security Plan		Accepted.		Comment resolved pending DOI review of the final design documents.
Specific Comments – Construction/Remedial Action Work Plan, Appendix R: Waste Management Plan											
1182	DOI-262	Non-design	Editorial	Acronyms and Abbreviations/iii	Department of Interior	Correct to: Department of the Interior	The acronyms and abbreviations listed will be revised to read "Department of the Interior."		Accepted.		Comment resolved.
1183	DOI-263	Non-design	Other	3.1/3-1	Liquid wastes containing 0.5 percent or more filterable solids will be analyzed using the toxicity characteristic leaching procedure (TCLP), …	It is unclear from the explanation if the solids will be separated from the liquids prior to testing and if the resulting liquids would then be tested separately. Please clarify.	As specified in EPA Test Method 1311, the Toxicity Characteristic Leaching Procedure, if a waste contains less than 0.5% solids, only the filtered liquid portion is considered to be the TCLP extract and is subjected to chemical analysis. Text in first bullet will be revised to reflect the above. The cited sentence will be revised to read (revisions are shown in strikeout [~~strikeout~~; for text deletion] and underline [underline; for text addition]): "Liquid wastes containing 0.5 percent or more filterable solids, the filtered solids will be analyzed…"		Resolved.		Comment resolved.
1184	DOI-264	Non-design	Other	3.1.2/3-2	Solid wastes will be analyzed for total metals…	Several waste streams identified in Section 2 could fall into the category of solid waste. It would be beneficial for the reader to define "solid waste" either directly or by reference to Section 261.2 of RCRA.	The term "solid waste" used in this section refers to solid materials, as opposed to liquid materials, and does not refer to the RCRA definition of solid waste. Waste generated by construction activities will be classified as hazardous or non-hazardous based on the requirements of the California Hazardous		Resolved.		Comment resolved.

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							Waste Control Law (California Health and Safety Code, Division 20, Chapter 6.5) and regulations (Title 22, California Code of Regulations, Division 4.5). Because EPA authorized California to implement RCRA based on enforcement of California's laws and regulation, the definition of solid waste in 40 CFR 261.2 is not relevant. California' waste classification system does not include a definition of solid waste. The corresponding definition in California regulations is the definition of "waste" in 22 CCR 66261.2. All of the materials being managed under this waste management plan are considered waste under this definition.				
1185	DOI-265	Non-design	Other	3.1.3/3-2	Empty, used 55-gallon drums that formerly contained hazardous materials will be labeled with the word "empty" and the date emptied and will be returned to the original chemical supplier or turned over to a drum reconditioner.	PG&E must ensure that drums containing hazardous materials are emptied in accordance with appropriate regulations prior to storage and shipment. DTSC has developed regulations that set forth a definition of "empty container." The regulations are found in Title 22, California Code of Regulations, Section 66261.7.	This section will be revised to read: "Empty, used 55-gallon drums that formerly contained hazardous materials will be labeled with the word "empty" and the date emptied and will be returned to the original chemical supplier or turned over to a drum re-conditioner. <u>Containers managed as empty will meet the requirements of 22 CCR 66261.7</u>."		Accepted.		Comment resolved.
1186	DOI-266	Non-design	Other	3.2.3/3-2	Concrete and asphalt rubble that exhibits visual evidence of contamination (staining, residue, etc.) will be sampled by chipping or coring.	All concrete/asphalt sampling, including in situ sampling, shall be biased toward visible staining.	The following sentence will be added. "<u>Samples will be collected from the stained areas to identify the nature of the contaminants. For waste disposal purposes samples will be collected, in accordance with procedures that are acceptable to the disposal site</u>."		Accepted.		Comment resolved.

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							An SOP was prepared for this activity (see **Attachment AA** of the final RTC table).				
1187	DOI-267	Non-design	Editorial	3.2.3/3-2	Classified as nonhazardous unless visual evidence of contamination observed.	The first sentence needs a subject, i.e., Contaminated concrete and asphalt rubble is…	The sentence will be revised to read: "<u>Concrete and asphalt rubble will be</u> classified as nonhazardous unless visual evidence of contamination is observed or generator knowledge suggests that contamination may have occurred."		Accepted.		Comment resolved.
1188	DOI-268	Non-design	Editorial	3.2.3/3-2	Concrete and asphalt rubble that exhibits visual evidence of contamination (staining, residue, etc.) will be sampled by chipping or coring.	An SOP needs to be prepared for sampling this type of debris. The depth of penetration of chipping or coring should be representative of the contamination penetration depth so as to not dilute the contamination with underlying non-contaminated material. Although a core through the entire floor slab may seem to be more representative of the debris disposed in a landfill or possibly reused, it is water contact with the surface contaminated material that results in leaching of contaminants.	See RTC #1186 DOI-266.		Resolved.		Comment resolved.
1189	DOI-269	Non-design	Editorial	3.2.3/3-3	One composite sample will be collected at each location.	How will the number of subsamples to be composited be determined? Please also consider that a large stained area may need to be subdivided into units for composite sampling so that the compositing does not mask hot spots of contamination, and so that identified hot spots that exceed non-RCRA and RCRA hazardous waste limits can be managed separately from other non-hazardous waste debris.	The text will be revised as follows (revisions are shown in strikeout [~~strikeout~~; for text deletion] and underline [<u>underline</u>; for text addition]): "One composite sample <u>consisting of four subsamples</u> will be collected at each ~~location~~ <u>distinct area of demolition. Depending on their size, individual stained areas may be sampled separately</u>."		Resolved.		Comment resolved.
1190	DOI-270	Non-design	Editorial	3.2.5/3-3	Concrete washout water will be tested for pH USEPA Methods 9040C or 9045D. A single representative sample will be collected for each batch of waste, or it can be consistently determined that the waste is nonhazardous.	The second sentence does not make sense. Please clarify. The pH of concrete washout water is approximately 12. Although the pH should not exceed 12.5, which would render it a corrosive hazardous waste, the washout water should be recycled to the maximum extent possible.	The text will be revised as follows (edits are shown in strikeout [~~strikeout~~; for text deletion] and underline [<u>underline</u>; for text addition]): "Concrete washout water will be tested for pH USEPA Methods 9040C or 9045D. A single representative sample will be collected for each batch of waste, ~~or it can be consistently determined that the~~		Accepted.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							~~waste is nonhazardous~~ until several representative samples test below the hazardous waste limit of 12.5, after which time the washout water will be presumed to be non-hazardous. Washout water will be recycled to the maximum extent feasible.”				
1191	DOI-271	Non-design	Editorial	3.2.6/3-3	Testing will not be necessary in cases where contaminants could not reasonably be expected to occur at hazardous waste concentrations in the decontamination solution.	What decontamination solutions would be expected to have hazardous waste levels of contamination? If none are expected, this section should state this and indicate no testing will be performed. If there are decontamination solutions that could have hazardous waste levels of contamination, please identify them to ensure that testing is performed.	To date, PG&E's experience from drilling and sampling activities for both groundwater and soil programs, on and off the Compressor Station, is that solutions generated from equipment decontamination used do not exhibit hazardous waste characteristics. Because remedy construction activities will be contacting similar materials we expect that decontamination solutions from remedy construction will also not exhibit hazardous waste characteristics. Testing will be performed to verify that the acceptance criteria for the disposal method being used (e.g., disposal at TCS evaporation ponds, IM3 treatment plant, or offsite disposal) are being met. This section will be revised to read as follows: “Solutions generated by decontaminating equipment are not expected to exhibit hazardous waste characteristics. Testing will be performed initially to profile the solutions and to verify that the acceptance criteria for the disposal method being used (e.g., disposal at TCS evaporation ponds, IM3 treatment plant, or offsite disposal) are being met. ~~that has~~	Please note, it is the generator's responsibility to ensure proper waste classification and management. Although PG&E may manage subsequent waste steam based on knowledge gathered during initial testing of that waste stream, it is PG&E's responsibility to retest the waste stream if it is somehow changed or different from the initial sample.	Resolved.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							~~handled hazardous waste or hazardous materials will be tested for the hazardous constituents to which the equipment has been exposed. Testing will not be necessary in cases where contaminants could not reasonably be expected to occur at hazardous waste concentrations in the decontamination solution. Water from rinsing groundwater sampling equipment will not be tested.~~"				
1192	DOI-272	Non-design	Other	3.2.13	Equipment that is visibly contaminated and cannot be decontaminated will take on the same characteristics as the contacted media…	Revise the text to clarify how the equipment will be handled based on the characteristics of the contacted media.	This section will be revised to read as follows: "Equipment that is visibly contaminated and cannot be decontaminated will take on the same characteristics as the contacted media. <u>If the media has been classified as hazardous, the sampling equipment will be classified and managed as hazardous waste. If the media has been classified as non-hazardous, the sampling equipment will be classified and managed as non-hazardous waste.</u> Disposable sampling equipment that shows no visible evidence of contamination will be disposed as nonhazardous waste <u>regardless of the classification of the media to which it has been exposed</u>."		Accepted.		Comment resolved.
1193	DOI-273	Non-design	Editorial	3.2.17/3-4	This collected water will be considered stormwater unless visual evidence of contamination or pollutant sources identified, …	Correct text to: This collected water will be considered stormwater unless visual evidence of contamination or pollutant sources <u>are</u> identified,	The text will be corrected as specified.		Accepted.		Comment resolved.
1194	DOI-274 (Comment	Non-design	Process	3.2.17/3-4		The site may be subject to the substantive portions of the California State Water Board's General Construction (2009-0009-DWQ) and/or General Industrial (2014-0057-DWQ) Permits.	This section will be		Accepted.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
	submitted to DOI by CA State Waterboard – Jose Cortez)						revised to read as follows: "This collected water it will be managed in accordance with Best Management Practices (BMP) Plan, which is consistent with the substantive requirements of the General Permit for Stormwater Discharges Associated with Construction Activities (2009-0009-DWQ), and is provided as Appendix M to this C/RAWP." An Industrial Storm Water Pollution Prevention Plan for operation of the Topock Groundwater Remedy consistent with the substantive requirements of Order 2014-0057-DWQ is included as Appendix D to Volume 1 of the Operation and Maintenance Manual.				
1195	DOI-275 (Comment submitted to DOI by CA State Waterboard – Jose Cortez)	Non-design	Process	3.2.18/3-4		This activity may be subject to the CA State Water Board's General Order 2003-0003-DWQ for low threat discharges.	For consistency with text in Section 4.5.3.2 (Onsite Management of Construction Water), Onsite Reuse, this section will be revised to read as follows (revisions are shown in strikeout [~~strikeout~~; for text deletion] and underline [underline; for text addition]): "~~Water from hydrostatic testing of conveyance piping is presumed to be nonhazardous unless it exhibits visual evidence of contamination (sheen, discoloration, or suspended solids). Analytical parameters for water suspected to be contaminated will be selected based on the type of contamination observed.~~ Water from hydrostatic testing of conveyance piping may be reused onsite in a manner that complies with the State Water		Accepted.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							Resources Control Board Water Quality Order No. 2003-003-DWQ, Statewide General Waste Discharge Requirements for Discharges To Land With A Low Threat To Water Quality. The permit states that "The discharge of water main, water storage tank, water hydrant pipeline flushing, or hydrostatic testing water from tanks or pipelines that have been used to store or convey any medium other than potable water is prohibited, unless the Discharger has demonstrated to the Regional Board that all residual pollutant concentrations have been reduced to levels below Regional Board Basin Plan groundwater quality objectives."(Paragraph 7 on page 4). The water generated from hydrostatic testing will be low-volume discharges with minimal pollutant concentrations and will not be reused in a manner that results in a discharge to waters of the United States or waters of the state. The volume and date of each reuse event will be recorded."				
1196	DOI-276	Non-design	Editorial	4.1.2.3/4-2	Accumulation start date	The label shown does not have entry for accumulation start date. Please revise accordingly.	The text will be revised to delete the reference to accumulation start date, which is not required on a non-hazardous waste label.		Accepted.		Comment resolved pending DOI review of the final design documents..
1197	DOI-277	Non-design	Other	4.1.4.2/4-3	Satellite accumulation areas are limited to 55 gallons of each waste type.	Add: or 1 quart of acute hazardous waste. The regulations limit the total volume of hazardous waste at a single Satellite accumulation area (SAA) to 55 gallons (or 1 quart of acute hazardous waste). (See 40CFR § 262.34(c)(1))	California regulations (22 CCR 66262.34(e)(2) specify that a separate 55 gallon limit applies to each waste type if the waste streams are not compatible, or if combining the waste streams is not practical (e.g., prevents recycling or requires unreasonable		Accepted.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							accumulation procedures). This section will be revised to read as follows: "Satellite accumulation areas may be used to store hazardous waste at or near the point of generation at a location under the control of the operator of the process generating the waste. Satellite accumulation areas are limited to 55 gallons of waste or 1 quart of acutely hazardous or extremely hazardous waste. A separate 55 gallon limit applies to each incompatible waste, and to wastes that are not practicable to combine ((e.g., prevents recycling or requires unreasonable accumulation procedures)."				
1198	DOI-278	Non-design	Other	4.1.4.2/4-3	Satellite accumulation areas are not required to maintain the equipment described in Section 4.1.4.1 and are not subject to the inspections described in Section 4.1.8; however, meeting these requirements is still a good practice.	SAA regulations do require that waste containers must be under the control of the operator of the process generating the waste, in good condition (265.171), compatible with its contents (265.172), and closed except when adding or removing waste (265.173). These requirements should be addressed as they aid in achieving the goal of inspections.	The following text will be added: "Containers in satellite accumulation areas must be under the control of the operator of the process generating the waste, in good condition, compatible with the contents, and be kept closed except when adding or removing waste."		Accepted.		Comment resolved.
1199	DOI-279	Non-design	Editorial	4.2.3.2/4-6	Characterize and classify the gas in accordance with Section X.3.	The cited section does not exist in this document. Please revise accordingly.	This section will be revised to read "Characterize and classify the gas in accordance with Section ~~X.~~3"		Accepted.		Comment resolved.
1200	DOI-280	Non-design	Editorial	4.2.4/4-6	Concrete and asphalt rubble will be managed as non-hazardous waste, …	To rectify the difference between 3.2.3 and 4.2.4, please modify to: Concrete and asphalt rubble which shows no evidence of contamination …	This section will be revised to read as follows: "Concrete and asphalt rubble which is not associated with known hazardous material operations, shows no visible		Accepted.		Comment resolved.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							evidence of contamination, or has been tested and found to be non-hazardous, will be managed as non-hazardous waste…" Details of concrete and asphalt sampling are provided in the new SOP (see **Attachment Z** of the final RTC table).				
1201	DOI-281	Non-design	Editorial	4.2.4/4-6	Concrete and asphalt rubble will be managed as non-hazardous waste…	This section needs to acknowledge that some concrete/asphalt rubble may be classified as non-RCRA or RCRA hazardous waste per characterization in accordance with Section 3.2.3, and must be managed as hazardous waste or decontaminated and then managed as non-hazardous waste.	The following sentence will be added: "Concrete and asphalt rubble may be classified as non-RCRA or RCRA hazardous waste per characterization in accordance with Section 3.2.3, and must be managed as hazardous waste or decontaminated and then managed as non-hazardous waste."		Accepted.		Comment resolved.
1202	DOI-282	Non-design	Editorial	4.2.12/4-8	Otherwise, solutions will be disposed at a permitted offsite disposal facility.	Please revise to state – "Otherwise, solutions will be disposed at an offsite disposal facility permitted to receive the type of waste based on characterization and classification.	The section will be revised as specified.		Accepted pending review.		Comment resolved.
1203	DOI-283	Non-design	Legal	5.1.5/5-5	PG&E proposes use of the following potential disposal facilities for the project as well as others, subject to the communication and approval processes under the Consent Decree outlined above: …	At the time of this writing (12/2014), discussions with EPA Region 9 indicate that the following facilities are approved to receive CERCLA waste: (1) CWM Kettleman Hills (2) US Ecology, NV (3) Clean Harbors, Buttonwillow. Please remove PSC Rancho Cordova from consideration for disposal of CERCLA waste at this time.	PSC Rancho Cordova will be removed.		Accepted.		Comment resolved pending DOI review of the final design documents..
Specific Comments – Construction/Remedial Action Work Plan, Appendix U: Programmatic Biological Assessment											
1204	FMIT/TRC	Non-design	Editorial	C/RAWP Append U Programmatic Biological Assessment	FIGURE 7 PROPOSED CONSTRUCTIO N STAGING, SOIL STORAGE, AND ACCESS ROUTES	This figure does not appear to correctly represent the Undisturbed and Archaeological/ Historical Sites. Please ensure that this is updated to reflect the most recent understanding of the cultural historical properties on the site. The Tribes' position has always been that any prior disturbance to an area does not justify further disturbances.	PG&E agrees that previous disturbance is not a justification for further disturbance. However, the proposed remedy construction footprint represented the minimum for what is required to build the system and has preferentially used previously disturbed			Tribe agrees that decisions as to which areas should preferentially be disturbed should be decided in discussions with the Tribes.	DTSC response: Tribal comment noted.

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
							areas over those that were previously undisturbed as required by DTSC. Specifically, Mitigation Measure CUL-1a-9 requires PG&E, "in communication with the Interested Tribes (and subject to their review), and to the maximum extent feasible, as determined by DTSC, give: (1) priority to previously disturbed areas for the placement of new physical improvements; and (2) priority to re-use of existing physical improvements, such as but not limited to wells and pipelines, but not including IM-3 facilities." Under this mitigation measures, "disturbed" areas "means those areas outside of documented archaeological site boundaries that have experienced ground disturbance in the last 50 years." Similarly, the PA requires that "[n]ew facilities or activities will be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable, consistent with protecting human health and the environment and achieving cleanup in a timely manner." See PA Section III(B)(2)(c); CHPMP Section 7.1.				
1205	Hualapai/TRC	Non-design	Editorial	C/RAWP Append U Programmatic Biological Assessment	FIGURE 7 PROPOSED CONSTRUCTIO N STAGING, SOIL STORAGE, AND ACCESS ROUTES	This figure does not appear to correctly represent the Undisturbed and Archaeological/ Historical Sites. Please ensure that this is updated to reflect the most recent understanding of the cultural historical properties on the site. The Tribes' position has always been that any prior disturbance to an area does not justify further disturbances.	See above				
1206	Cocopah/TRC	Non-design	Editorial	C/RAWP Append U Programmatic Biological Assessment	FIGURE 7 PROPOSED CONSTRUCTIO N STAGING, SOIL STORAGE, AND ACCESS ROUTES	This figure does not appear to correctly represent the Undisturbed and Archaeological/ Historical Sites. Please ensure that this is updated to reflect the most recent understanding of the cultural historical properties on the site. The Tribes' position has always been that any prior disturbance to an area does not justify further disturbances.	See above				

Appendix I – Response to Comments on the 90% Design Documents (Basis of Design Report, O&M Manual, Construction/Remedial Action Work Plan)

Groundwater Remedy Basis of Design Report/Final (100%) Design

PG&E Topock Compressor Station, Needles, California

Comment No.	Unique Comment ID (if applicable)*	Comment Type (Design/ Non-Design)	Comment Category	Section/ Page	Reference Text	90% Design Comment *(Please provide sufficient detail, include specifically what you are looking for)*	PG&E Response	DTSC Response	DOI Response	Tribes Response	Final Resolution
1207	Chemehuevi/ TRC	Non-design	Editorial	C/RAWP Append U Programmatic Biological Assessment	FIGURE 7 PROPOSED CONSTRUCTIO N STAGING, SOIL STORAGE, AND ACCESS ROUTES	This figure does not appear to correctly represent the Undisturbed and Archaeological/ Historical Sites. Please ensure that this is updated to reflect the most recent understanding of the cultural historical properties on the site. The Tribes' position has always been that any prior disturbance to an area does not justify further disturbances.	See above				
1208	FMIT/TRC	Non-design	Editorial	C/RAWP Append U Programmatic Biological Assessment		Ensure the PBA is updated to include the Townsend Long eared bat	The PBA is a document that deals with Federally Protected Species under the Endangered Species Act. Because the Townsend's big-eared bat is a candidate for State listing, it is not appropriate to include in the PBA.			Noted.	
1209	Hualapai/TRC	Non-design	Editorial	C/RAWP Append U Programmatic Biological Assessment		Ensure the PBA is updated to include the Townsend Long eared bat	See above			Noted.	
1210	Cocopah/TRC	Non-design	Editorial	C/RAWP Append U Programmatic Biological Assessment		Ensure the PBA is updated to include the Townsend Long eared bat	See above			Noted.	
1211	Chemehuevi/ TRC	Non-design	Editorial	C/RAWP Append U Programmatic Biological Assessment		Ensure the PBA is updated to include the Townsend Long eared bat	See above			Noted.	

* Comment ID as appeared in the commenter's original comment letter where applicable. The commenter's affiliation is also added for information purpose.

Roadmap -- Attachments to Final 90% RTC Table			
RTC #	**Subject**	**Revision since June 26 or August 5 submittals?**	**Location**
8, 12	Exec Summary Section on Decommissioning	Yes – to incorporate edits from DTSC.	Attachment A
17	AZ SHPO Correspondence dated February 4, 2008	No	Attachment B
19, 104, 817, 821, 827-833	Revised design for BCW northern and southern crossings	No	Attachment C
27, 72, 995	Construction and startup sequencing details	No	Attachment D
135, 267, 300	Additional details on tie-in with Topock-2 and 3	The final design will reflect response to DTSC's comment and will include the design of the piping from the gate valves to the remedy fresh water tank in both map and section view.	Attachment E
140	BOD Appendix M Figures	No	Attachment F
196	BOD Revised Figure 2.1-1	No	Attachment G
223	Photo of a 500 to 1,000-gallon portable tank being pulled by a pick-up truck	No	Attachment H
296	Additional 12-inch FW pipe (in the event pre-treatment is required)	No	Attachment I
313	O&M Vol 2 Revised Exhibit 5.3-1	No	Attachment J
354	BOD Revised Figure 3.4-3	No	Attachment K
418	Development of the Simulated Threshold TOC Concentrations for Reduction of Cr(VI)	No	Attachment L
634	Revised Remedy-SOP-08 (Inspection of Frac Tanks)	No	Attachment M
657	OSHA Suggested Spotting Signals for Vehicles	No	Attachment N
662	Revised RTC-SOP-09	No	Attachment O
711	Figures 711-1 and 711-2 Proposed Well Pairs In Model Layers 3 and 4	No	Attachment P
803	Revised design for Park Moabi	No	Attachment Q
	Revised Management Protocol for Displaced Materials	Yes – to revise Box 16 (in flowchart) to mention post risk assessment completion and corresponding text in the memo	
867	C/RAWP Revised Exhibit 2.3-1	No	Attachment S
932	New C/RAWP exhibit in Section 3.2.1.2, List of Well Locations for Borehole Groundwater Sample Collection	Yes – to incorporate inputs from DTSC	Attachment T
938	New C/RAWP Section 3.2.1.6, Baseline Well Sampling - plans	No	Attachment U

	and methods to collect initial baseline samples from all new wells		
1055	CQAPP Revised Figure 2-1	No	Attachment X
1057	Third Party Testing and Inspection by QA	No	Attachment Y
1155	IM3 Decommissioning Plan: Revised Figure 4-1	No	Attachment Z
1157, 1186, 1188	New REMEDY-SOP-10 (Sampling of Concrete/Asphalt Demolition Waste	No	Attachment AA
136	TW and MW-20 Bench -- Consolidation of Carbon Storage/ Dosing Design and Operations	The final design will address DTSC's comments and will replace the leach field at TW Bench with a septic tank (specifically drawings C-008-03 and 04).	Attachment BB
4, 17, 22, 32, 41, 43, 126	MW-X and MW-Y	Not applicable. This is a new attachment added after the Aug 5 submittal	Attachment CC
313, 815, 1005, 1012	Miscellaneous revised figures from BOD, O&M Manual, and C/RAWP	Yes to Attachment W (C/RAWP Figure 4.2-3 Access Route) only – to incorporate inputs received at the August 26-27 TWG meeting.	Attachments J, R, W, and V

Attachment A: RTC #8 and #12

New Decommissioning Section of the Executive Summary

ES.6 Remedy Decommissioning Process

As directed by DTSC in comments on the 90% BOD (90% RTCs #8 DTSC-4, #12 DTSC-8 [Appendix I]), this section describes the decommissioning process envisioned for the proposed remedy even though it is understood that ~~a~~ the detailed decommissioning plan will be prepared much later in the remedial process.

In compliance with the Agencies' April 4, 2014 directive letter (DTSC and DOI 2014), PG&E has and will continue to reiterate its commitment to remove all underground utilities and infrastructures to the extent practicable at the time of remedy decommissioning. Per DTSC's request, below is a conceptual list of remedy components that PG&E believes cannot or should not be removed at the end of the remedy (note that this list is based on current information and may be subject to change):

- Freshwater pipeline (and casing) under I-40;
- Piping/conduits located in (e.g., direct buried or in trenches) or under (e.g., jack and bore) paved, public roadways; and
- Subsurface infrastructure that property owner(s) or land manager(s) request not to be removed, and such request is approved by DTSC and DOI.

ES.6.1 Requirements Related to Remedy Decommissioning

Several documents require PG&E to prepare a plan for remedy decommissioning and/or impose requirements that apply to decommissioning activities of the remedy. This section presents the exact language in each of the documents that ~~requiring~~ require a remedy decommissioning work plan/~~,~~ decommissioning activities or that are otherwise applicable to decommissioning activities.

Programmatic Agreement (BLM 2010). Stipulation V of the PA includes the following applicable measures:

> *All facilities and appurtenances related to the Topock Remediation Project are to be removed as soon as practicable upon attainment of cleanup standards and a determination by DOI that removal of such facilities is protective of human health and the environment. PA, § V(A).*
>
> *All such removal will be planned in consultation with the Signatories, Tribes, and Invited Signatories following the guidelines in [PA] Appendix B [the consultation protocol]. PA, § V(A).*
>
> *The removal of such facilities shall be monitored following the monitoring guidelines in [PA] Appendix C [the tribal and archeological monitoring protocol]. PA, § V(B).*
>
> *The removal of such facilities shall take place along existing graded roads to the maximum extent practicable. PA, § V(C).*
>
> *Prior to decommissioning of any remediation facility, the Federal Agencies will consult with all Signatories, Tribes, and Invited Signatories during the development of the closure plan to determine how to best restore the areas affected by the Topock Remediation Project, including, but not limited to, the site of the existing treatment plant and related facilities, but excluding the Topock Compressor Station and related facilities, to ensure that environmental restoration of conditions existing prior to the construction of the Project is achieved to the extent practicable. PA, § V(D).*

Cultural and Historic Properties Management Plan (BLM 2012). The CHPMP also includes provisions applicable to remedy decommissioning:

> *PG&E will remove all other remediation facilities and appurtenances related to the Topock Remediation Project as soon as practicable following the attainment of cleanup standards and a determination by DOI that the removal of these facilities is protective of human health and the environment (BLM et al. 2010:13). CHPMP, § 6.2.3.*
>
> *A Remedy Decommissioning Plan will be drafted that will describe procedures for the removal and decommissioning of the groundwater remedy treatment system and associated infrastructure. The*

Plan will also describe the post-remedy restoration of the site to the conditions existing prior to the implementation of the remedial investigation and remedy construction, including related appurtenances and facilities, to the extent practicable. This Plan will be submitted by PG&E to DOI within 120 days of DOI's certification of completion of the CERCLA Remedial Action and determination by DOI that removal of such facilities is protective of human health and the environment. CHPMP, § 6.3.

PG&E will retain a qualified professional archaeologist to inspect and evaluate any previously unidentified or suspected archaeological or historical remains, including human remains and/or associated funerary objects or graves, uncovered during construction, operation, or decommissioning of the Project. Should any such remains, objects, or features be found, all Project activities will cease immediately within an area extending not less than 5 meters and not more than 50 meters (to be determined in the field on a case-by-case basis) from the potential find. The BLM, and Tribal representatives if the resource is Native American in nature, will be notified immediately of the discovery. No further work will be undertaken until the BLM, in consultation with Tribes and PG&E, has determined the nature of the discovery and developed appropriate measures for its evaluation and/or treatment, consistent with the PA. CHPMP, § 8.1.

The CHPMP also refers to Stipulation V of the PA, as previously outlined.

Consent Decree and Appendix C, Scope of Work to Consent Decree (DOI 2013). Section 9 of the CD states the following:

The Remedy Decommissioning Plan describes procedures for the removal and decommissioning of the groundwater remedy treatment system and associated infrastructure. The Plan will also describe the post-remedy restoration of the site to the conditions existing prior to the implementation of the remedial investigation and remedy construction, including related appurtenances and facilities, to the extent practicable. This Plan will be submitted by PG&E to DOI within 120 days of DOI's certification of completion of the RA and a determination by DOI that removal of such facilities is protective of human health and the environment. Removal of remediation facilities will be consistent with the PA.

Environmental Impact Report and Mitigation Monitoring and Reporting Program (DTSC 2011d). The EIR and the MMRP contain information relevant to decommissioning.

The EIR makes the following statements about decommissioning:

Following completion of the remedial action, when it is determined through monitoring cleanup of contaminated groundwater plume to background levels or 32 µg/l of Cr(VI), and/or following the determination that the remedial structures are no longer needed, the remedial facilities (e.g., in situ reductant storage and delivery systems, foundation material, process controls/instrumentation systems) would be decommissioned. EIR at 3-28.

Standard well decommissioning procedures required by San Bernardino County and the California Water Resources Department would be followed for the decommissioning of all wells (including remediation and monitoring). This would generally include either perforating the well casing and filling the well with cement grout or overdrilling the well. EIR at 3-28.

Decommissioning reductant storage facilities would include removing above grade treatment facilities from the site. Removed materials would be reused, transported to an off-site disposal facility, or sold as scrap material. EIR at 3-29.

While most facilities would be expected to be decommissioned following the completion of the remedial action, it is possible that water supply wells or the surface water intake structure may not be decommissioned and that it could be transferred to another use. EIR at 3-29.

Pipelines would be decontaminated as appropriate. Aboveground piping would be removed and either reused or disposed off-site as scrap material. Subsurface pipelines would likely be abandoned in place following decontamination. EIR at 3-30.

As wells and other infrastructure are removed and it is determined that access roads are no longer necessary, roads would be decommissioned from further use. The efforts involved in decommissioning would be dependent on the type of road (could be paved with asphalt, covered in gravel, or left unpaved) and the location of road (such as in previously disturbed areas or areas that were in a more natural state prior to the proposed project). EIR at 3-30.

The MMRP also contains several mitigation measures pertaining to decommissioning of the remedy.[1]

ES.6.2 Trigger for Remedy Decommissioning

As stated in response to 90% comment #28 FMIT-14, once the completion criteria/performance standards for the groundwater remedy are met to the satisfaction of the agencies, PG&E will submit a plan to decommission the remedy in accordance with the CD and CACA. The completion criteria/ performance standards for the remedy are presented in detail in both the 90% BOD (Sections ES-2 and 1.2.1) and the O&M Manual (Section L.4).

Due to heterogeneity in the aquifer at the Topock site, it is expected that during the decades-long O&M period there will be portions of the site that attain the completion criteria/performance standards at different times. During future evaluations, such as 5-year reviews, distinct geographical areas of the site, where criteria/standards have been attained and/or where it has been determined that Monitored Natural Attenuation (MNA) is appropriate to address residual chromium, could be designated (as appropriate) for Corrective Measure (CM)/Remedial Action (RA) Completion. At that time, PG&E can submit a request for certification of RA completion (CD Appendix C Section 8) and a CM completion report (CACA Attachment 6, Item G) to DOI and DTSC, respectively. Once DTSC and DOI are satisfied and determine that remedy facilities in those geographical areas are no longer needed, PG&E will proceed with decommissioning in accordance with the decommissioning plan.

ES.6.3 Conceptual Narrative of Key Remedy Decommissioning Steps

At this time in the design process and before the remedy is constructed, steps to decommission any remedy components, which will occur decades into the future, will have to be general and conceptual. Descriptions of the conceptual decommissioning steps (below and in the 60% RTC #6) reflects this fact. Any additional details provided herein should be considered speculative best estimates, and are subject to change based on information and conditions that become available prior to and at the time of remedy decommissioning.

- **Site preparation and demarcation** – typical activities include mobilization of resources (personnel, equipment, materials), delineate access/haul routes, demarcate work and support zones including staging areas, and set up temporary facilities. Temporary facilities may include trailers, restroom facilities, safety and security lighting, equipment storage area, and parking area.
- **Utility survey and isolation** – typical activities include locating and marking underground utilities prior to intrusive work, and isolation of identified utilities. Utilities may include water, sewer, gas, phone, and power lines. Underground Service Alert or “Dig Alert” will be contacted to identify public utilities that

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1 Mitigation measures included in the MMRP that apply during decommissioning include, but are not limited to, Mitigation Measure BIO-2c, which requires the preparation of a Bird Impact Avoidance and Minimization Plan based on surveys conducted prior to decommissioning and during the breeding season (as defined in the EIR for each species or suite of species), and CUL-1a-8e, which requires protocols for the appropriate methods to be used to restore the environment to its preconstruction condition upon decommissioning.

operate within the work areas. Identified utilities will be isolated and disconnected by the utility provider prior to decommissioning and removing portions of a utility.

- **System components decommissioning** – decommissioning renders the components permanently out of service. Typical activities include decontamination and removal~~ or abandonment in place~~. Decontamination will involve cleaning and removing waste materials, and render the components appropriate for reuse, recycle, or disposal. After decontamination, the components will generally be removed~~ or abandoned in place~~.

  PG&E has and will continue to reiterate its commitment to remove ~~of~~ all underground utilities and infrastructures to the extent practicable at the time of remedy decommissioning. Per DTSC's request, below is a conceptual list of remedy components that PG&E believes cannot or should not be removed at the end of the remedy (note that this list is based on current information and may be subject to change):

  - Freshwater pipeline (and casing) under I-40;
  - Piping/conduits located in (e.g., direct buried or in trenches) or under (e.g., via jack and bore) paved, public roadways; and
  - Subsurface infrastructure that property owner(s) or land manager(s) request not to be removed, and such request is approved by DTSC and DOI.

- **Waste characterization and management** – waste generated from decommissioning may include liquid wastes, solid wastes, and sludge. Waste will be characterized and managed appropriately.
- **Soil confirmation sampling, as needed** – subsequent to decommissioning and removal, soil confirmation sampling may be conducted to assess soil conditions as needed.
- **Post-decommissioning restoration** – after decommissioning and confirmation sampling are complete, site restoration will commence. Restoration activities will start with returning the land to a safe condition, backfilling of excavated infrastructure, and compacting uneven areas. Light grading and contouring may be required to provide proper drainage and to control erosion. Revegetation will occur after final grading and contouring.

The above conceptual steps apply to pipelines and vertical infrastructure. Decommissioning of wells will be in accordance with the approach outlined in the project Well Decommissioning SOP (Well-SOP-01) presented in the O&M Manual Volume 1, Appendix B.

Attachment B: RTC# 17

Arizona SHPO Correspondence dated February 4, 2008

EC/NHPA

Arizona State Parks

RECEIVED LAKE HAVASU FIELD OFFICE

2008 FEB -6 A 10: 36

LAKE HAVASU CITY, AZ

February 4, 2008

Steve Politsch, Field Manager
DOI-Bureau of Land Management
Lake Havasu Field Office
2610 Sweetwater Avenue
Lake Havasu City, AZ 86406

ATTN: Michael Johnson, Archaeologist

Re: Pacific Gas and Electric Company (PG&E) Topock Compressor Station Remedial Investigation; SHPO-2007-0694(35381); DOI-BLM; FWS; ADEQ

Dear Mr. Politsch:

Thank you for consulting with us on the above-proposed undertaking and on your finding of effect. We have reviewed the summary documentation included and concur with the Agency's finding of "no historic properties affected" based upon the level of information obtained in your tribal consultation efforts.

We appreciate your continued cooperation with this office in complying with the historic preservation requirements for federal undertakings. If you have any questions or concerns, please feel free to contact me at 602/542-7138, or e-mail me at ahoward@azstateparks.gov.

Sincerely,

Ann V. Howard

Ann Valdo Howard
Public Archaeology Programs Manager/Archaeologist
State Historic Preservation Office

C: John Earle, Fish & Wildlife Service
Jerry Smit, Arizona Department of Environmental Quality

Arizona State Parks
1300 W. Washington
Phoenix, AZ 85007

Tel & TTY 602.542.4174
www.azstateparks.com

800.285.3703 from
(520 & 928) area codes

General Fax:
602.542.4180

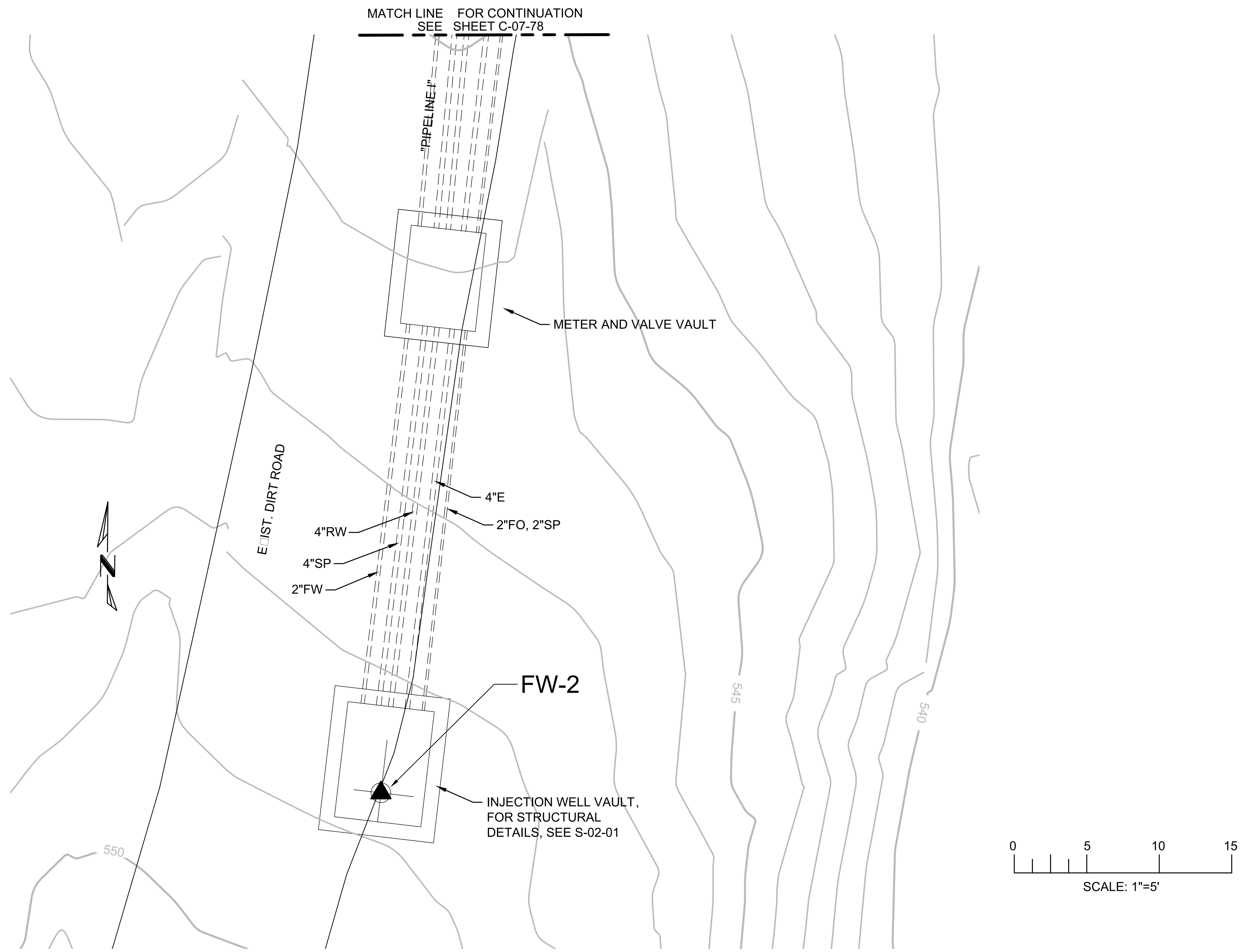
Director's Office Fax:
602.542.4188

Attachment C: RTCs #19, #104, #817, #821, and #827-833

Revised Design of Northern and Southern Bat Cave Wash Crossings

NOTES:

1. FOR STANDARD PLANS OF WELL VAULT AND METER VAULT, SEE DWG S-02-01.
2. FOR MECHANICAL PLANS OF WELL VAULT AND METER VAULT, SEE DWG M-02-01.
3. FOR PLC PANEL, SEE DWG E-02-01.
4. FOR STRUCTURAL PLANS OF VALVE BO□, SEE DWG S-02-□□



A FW-2 WELL VAULT SITE PLAN
1" = 5'
C-07-78

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
1	9/8/14	PRE-FINAL (90%) DESIGN		PH	PT	PT	VMB
0	4/5/13	INTERMEDIATE (60%) DESIGN		PC/EE	PT	PT	VMB

REVISIONS

APPROVED BY		
...	SO	
	SUPV	VMB
	DSGN	PT
	DWN	PH
	CHKD	VMB
	OK	VMB
	DATE	09/08/14
	SCALES	

TOPOCK GROUNDWATER REMEDIATION PROJECT

FRESHWATER INJECTION WELL FW-2 - SITE PLAN

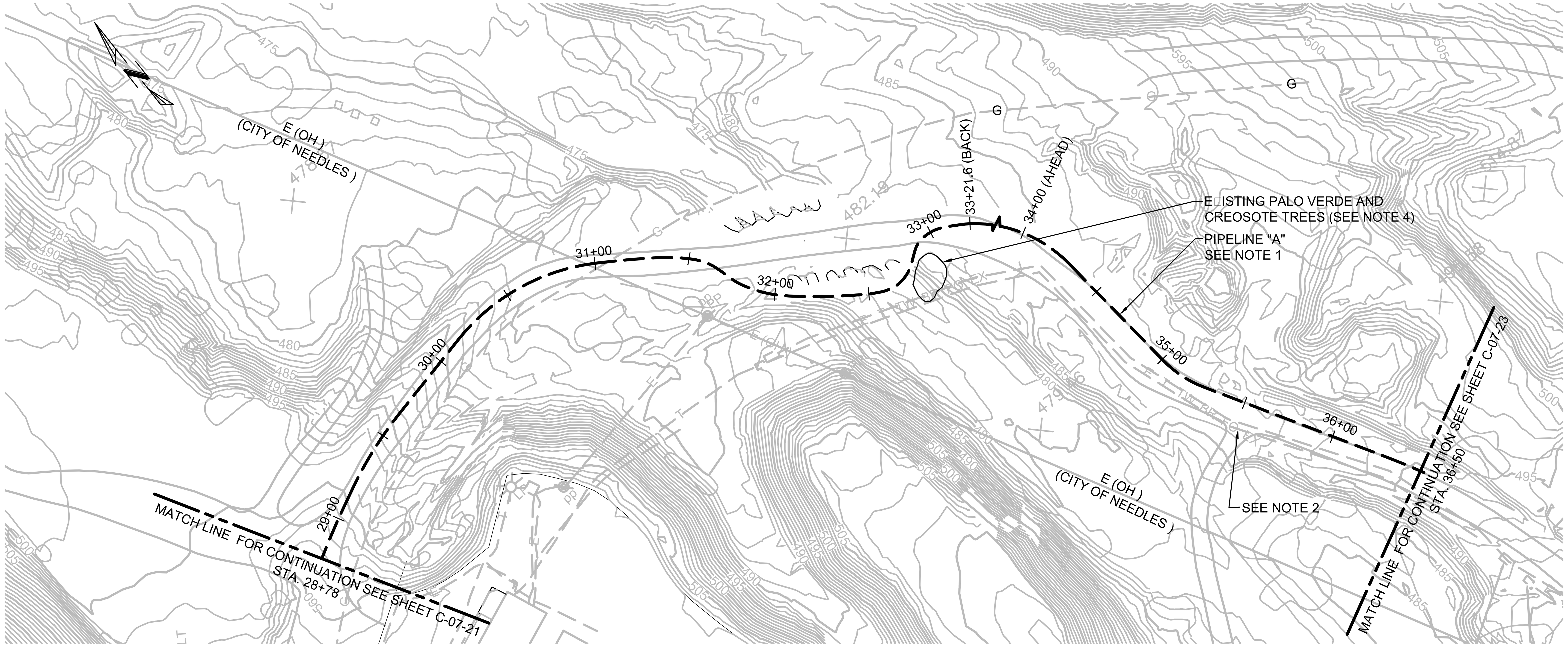
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-02-02
REV 1

08/04/2015, 19:29, G:\Gr□□□\AR TOPOCK-01 S□□□□100% DWG\C-C□□C-02-02.DWG, T□□: C-02-02

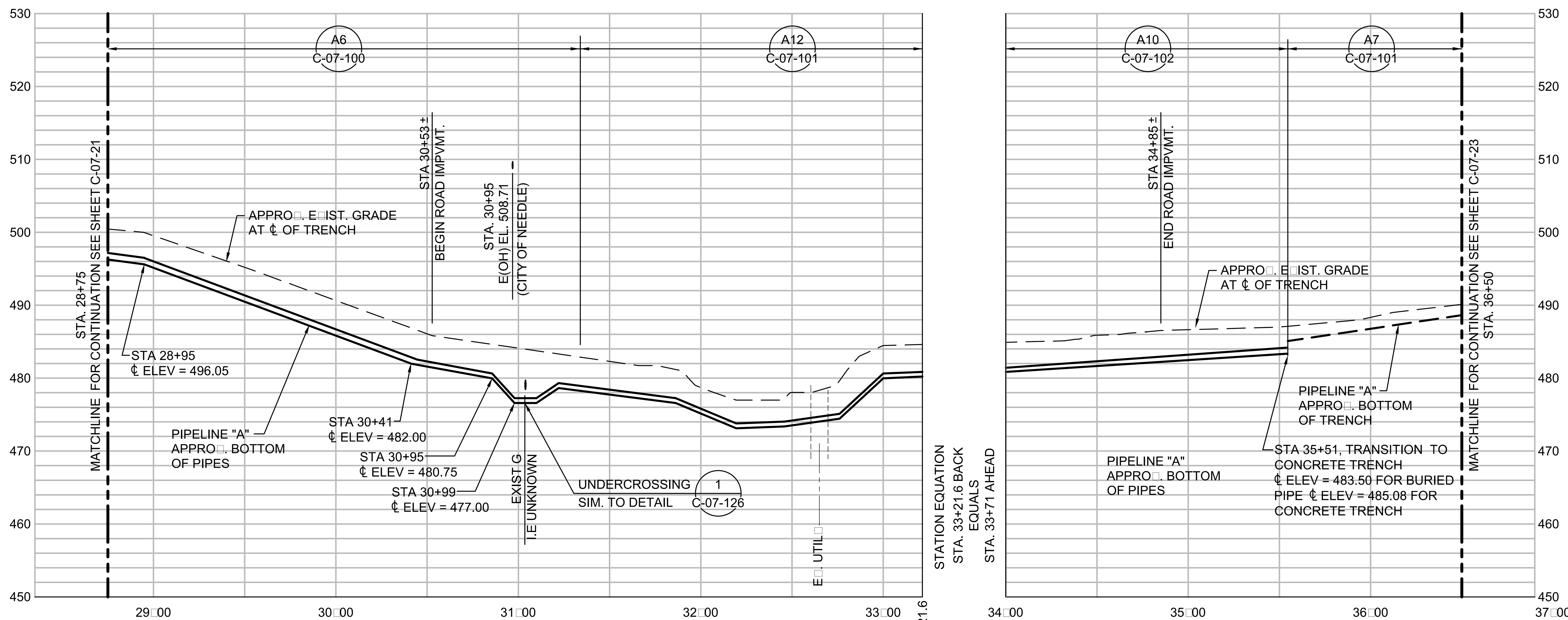
NOTES:

1. THE NEW PIPELINE ALIGNMENT SHOWS CENTER OF TRENCH.
2. PROVIDE VEHICLE ACCESS AT OWNER'S DIRECTION.
3. MAINTAIN 3' MINIMUM HORI□ONTAL CLEARANCE FROM E□ISTING IM-3 PIPING (E, T, TW, BR □ FO)
4. E□CAVATION SHALL AVOID SOIL DISTURBANCE WITHIN DRIP LINE OF MATURE VEGETATION.



PIPELINE "A" - PLAN

(SCALE: 1" = 40' H)



PIPELINE "A" - PROFILE

(SCALE: 1" = 40' H□1" = 10' V)

HOR□: SCALE: 1"=40' (0, 40, 80, 120)

VERT: SCALE: 1"=10' (0, 10, 20, 30)

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
4	8/5/15	90% RTC RESOLUTION		AJW	KLD	JPB	JEF
3	12/30/14	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		WTH	PT	PT	VMB
2	9/8/14	PRE-FINAL (90%) DESIGN		PH	PT	PT	VMB
1	4/5/13	INTERMEDIATE (60%) DESIGN		PC/EE	PT	PT	VMB
0	11/18/11	PRELIMINARY (30%) DESIGN		PC	PT	PT	VMB

REVISIONS

APPROVED BY		
JEF	SO	
	SUPV	JPB
	DSGN	KLD
	DWN	AJW
	CHKD	JPB
	OK	JEF
	DATE	8/5/15
	SCALES	

TOPOCK GROUNDWATER REMEDIATION PROJECT

PLAN AND PROFILE
PIPELINE "C"
STA 28□75 TO STA 36□50

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-07-22 REV 4

08/04/2015, 19:49, G: Gr□□□AR TOPOCK-01 S□□□□□100% DWG□C-C□□C-07-22.d□, T□□ C-07-22

N1808

NOTES
1. VAULT DETAILS SHOWN ON SHEETS M-□-□ AND S-□-□.
2. SEE CONDUIT AND CABLE SCHEDULES AND SINGLE LINE DIAGRAMS ON SHEETS E-00-12 THRU E-00-20.
3. CLEANOUT LOCATIONS PROVIDE CLEANOUT PIPING FOR ALL INJECTION, E□TRACTION, BACKWASH, AND REMEDY-PRODUCED WATER LINES AT INDICATED LOCATIONS (SEE DETAIL C-07-111).

PIPELINE "I" - PLAN

(SCALE: 1" = 20')

PIPELINE "I" - PROFILE

(SCALE: 1" = 20' H□ 1" = 10' V)

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY: SO, SUPV, DSGN, DWN, CHKD, OK, DATE 8/5/15, SCALES

TOPOCK GROUNDWATER REMEDIATION PROJECT
BATCAVE WASH-
PLAN AND PROFILE - PIPELINE "I"
STA 10□00 TO STA 16□00
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-07-78 REV 0

08/04/2015, 20:16, G:\Gr□□□□\AR TOPOCK-01 S□□□□\100% DWG\C-C□□\C-07-78-78A B\C□□W□□.d□, T□: C-07-78

N1808

PIPELINE "I" - PLAN

(SCALE: 1" = 20')

PIPELINE "I" - PROFILE

(SCALE: 1" = 20' H 1" = 10' V)

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY	
SO	
SUPV	
DSGN	
DWN	
CHKD	
OK	
DATE	8/5/15
SCALES	

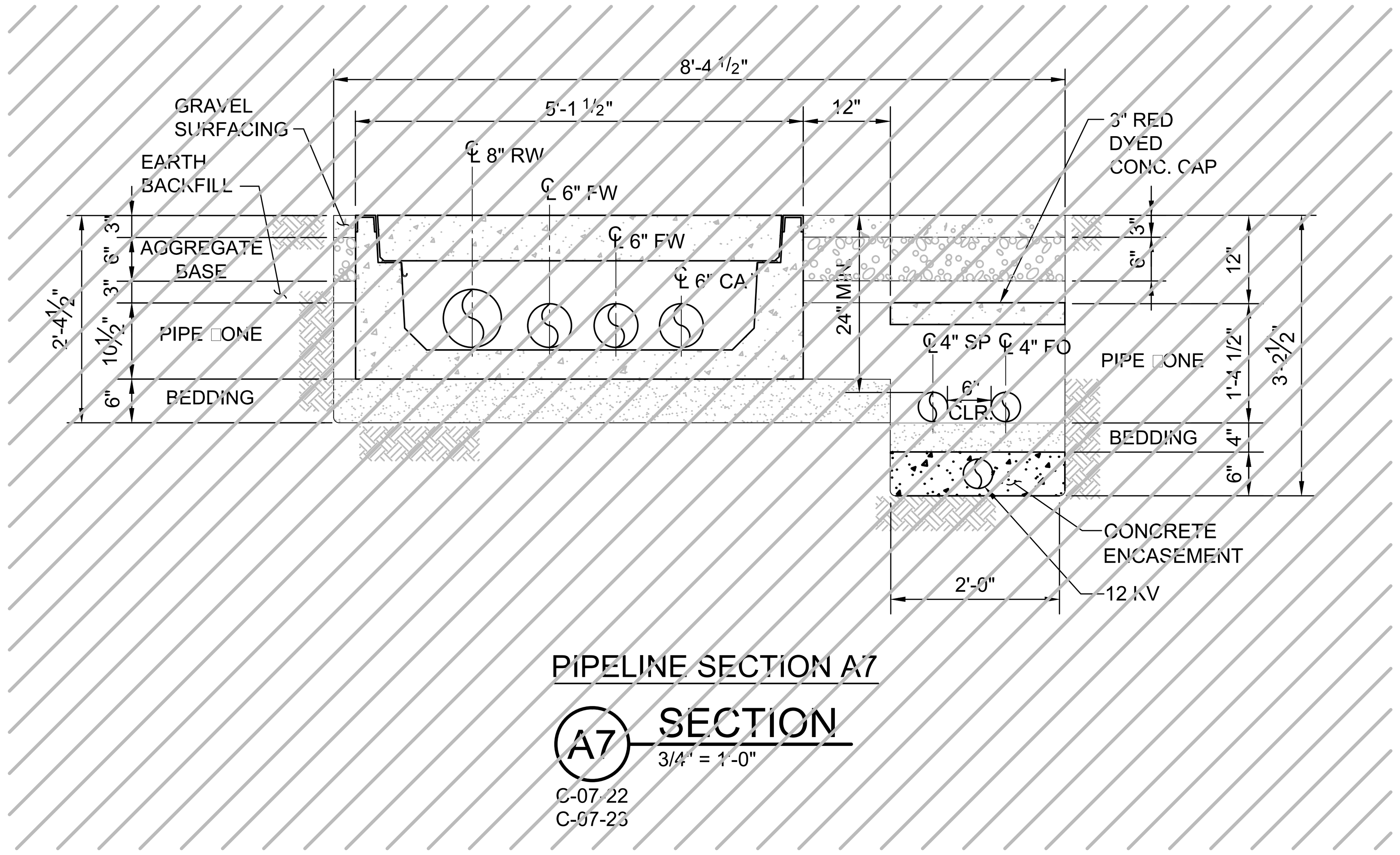
TOPOCK GROUNDWATER REMEDIATION PROJECT

BATCAVE WASH-
PLAN AND PROFILE - PIPELINE "I"
STA 16+00 TO STA 22+09

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

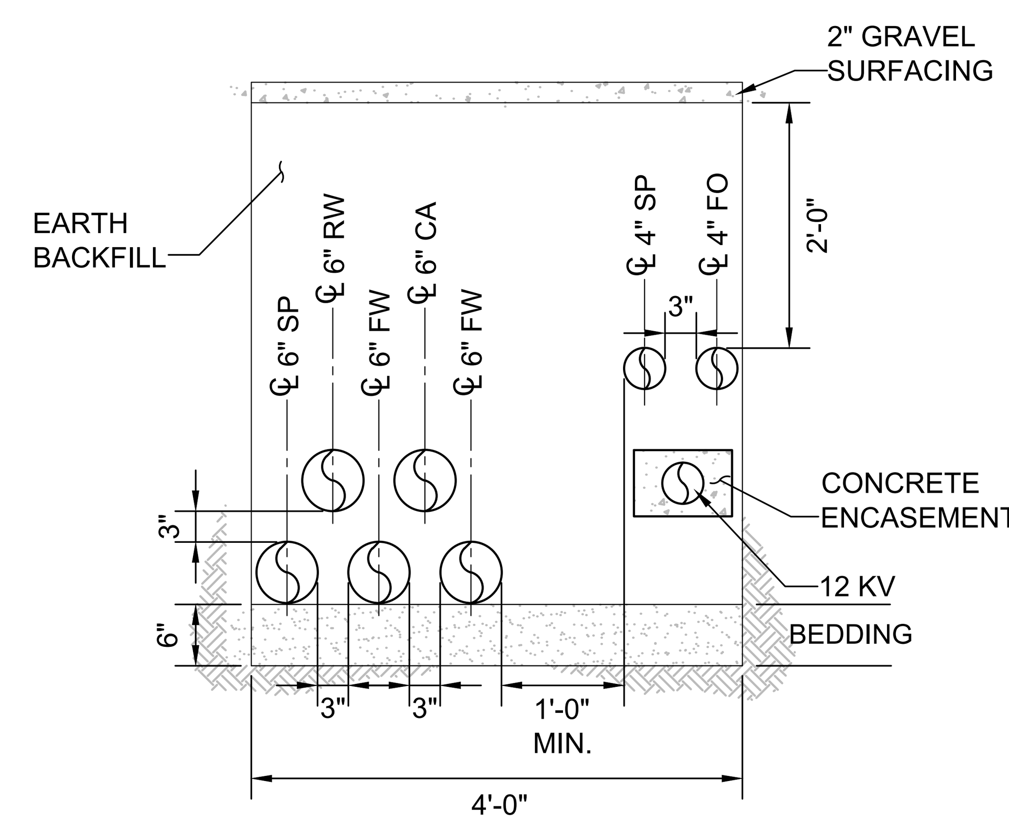
MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
C-07-78A	REV 0

N1808



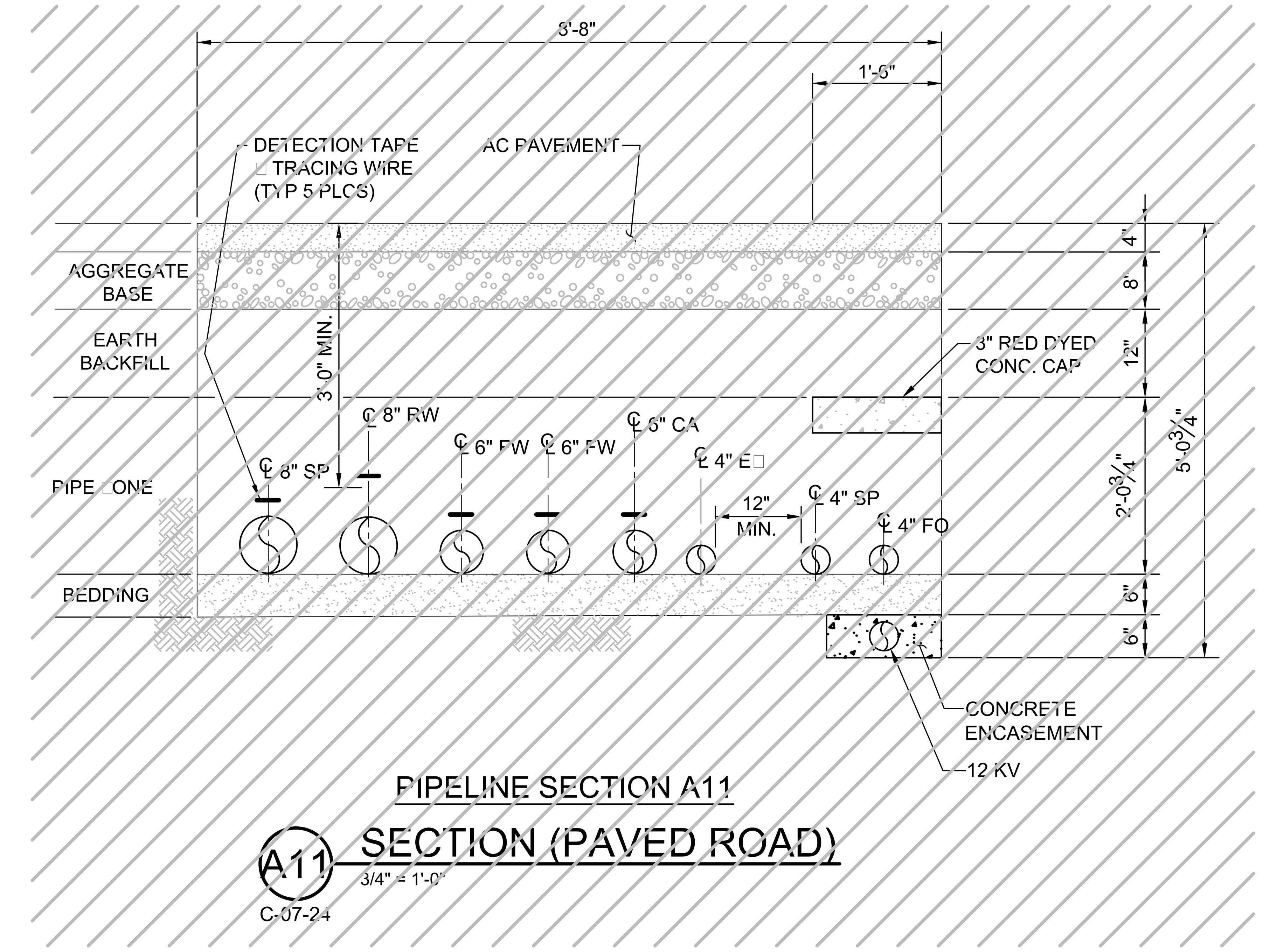
PIPELINE SECTION A7

A7 SECTION
3/4" = 1'-0"
C-07-22
C-07-23



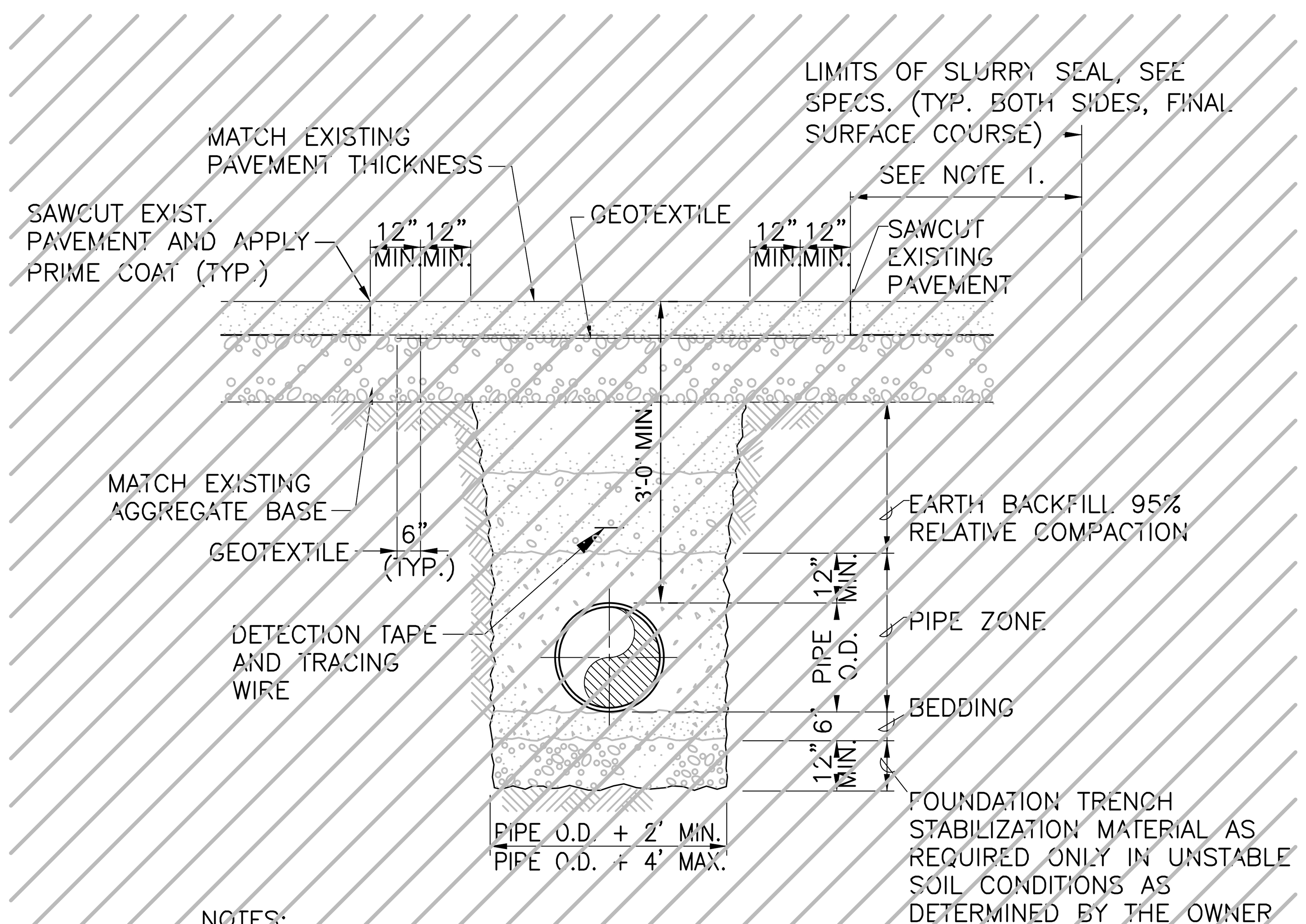
PIPELINE SECTION A12

A12 SECTION
3/4" = 1'-0"
C-07-22



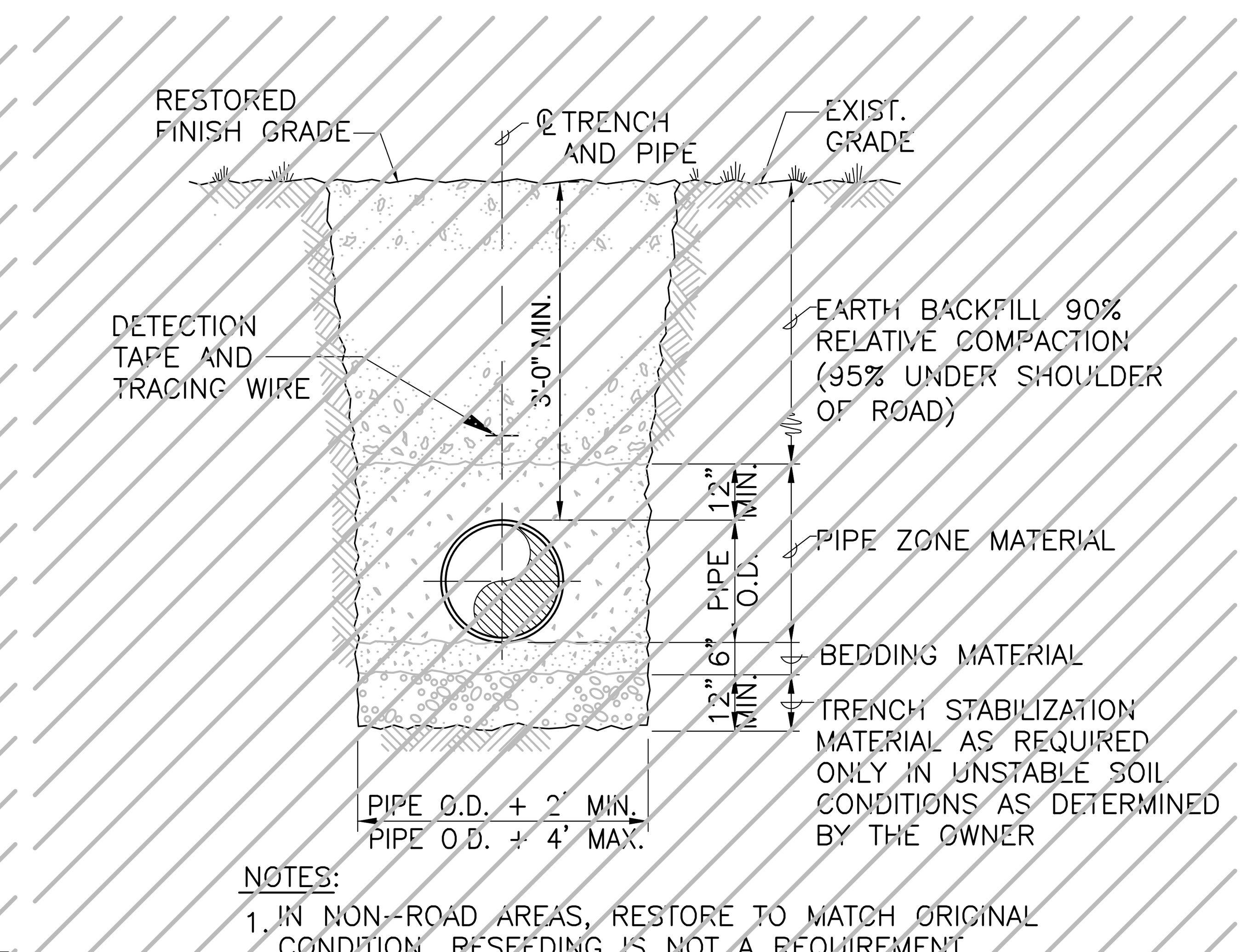
PIPELINE SECTION A11

A11 SECTION (PAVED ROAD)
3/4" = 1'-0"
C-07-24



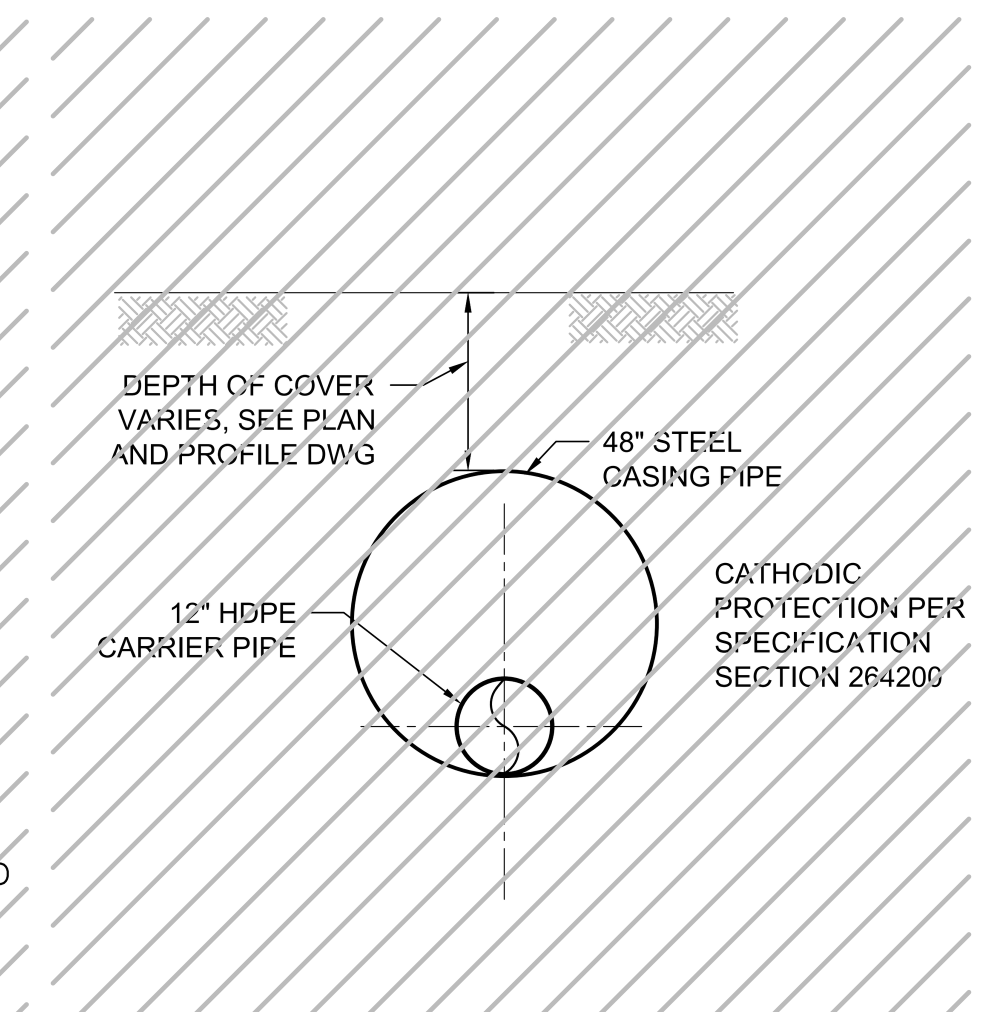
NOTES:
1. ABOVE MIN. APPLIES TO TRENCH TRANSVERSE TO STREET

B4 SECTION (IN PAVEMENT)
3/4" = 1'-0"
C-07-30
C-07-31

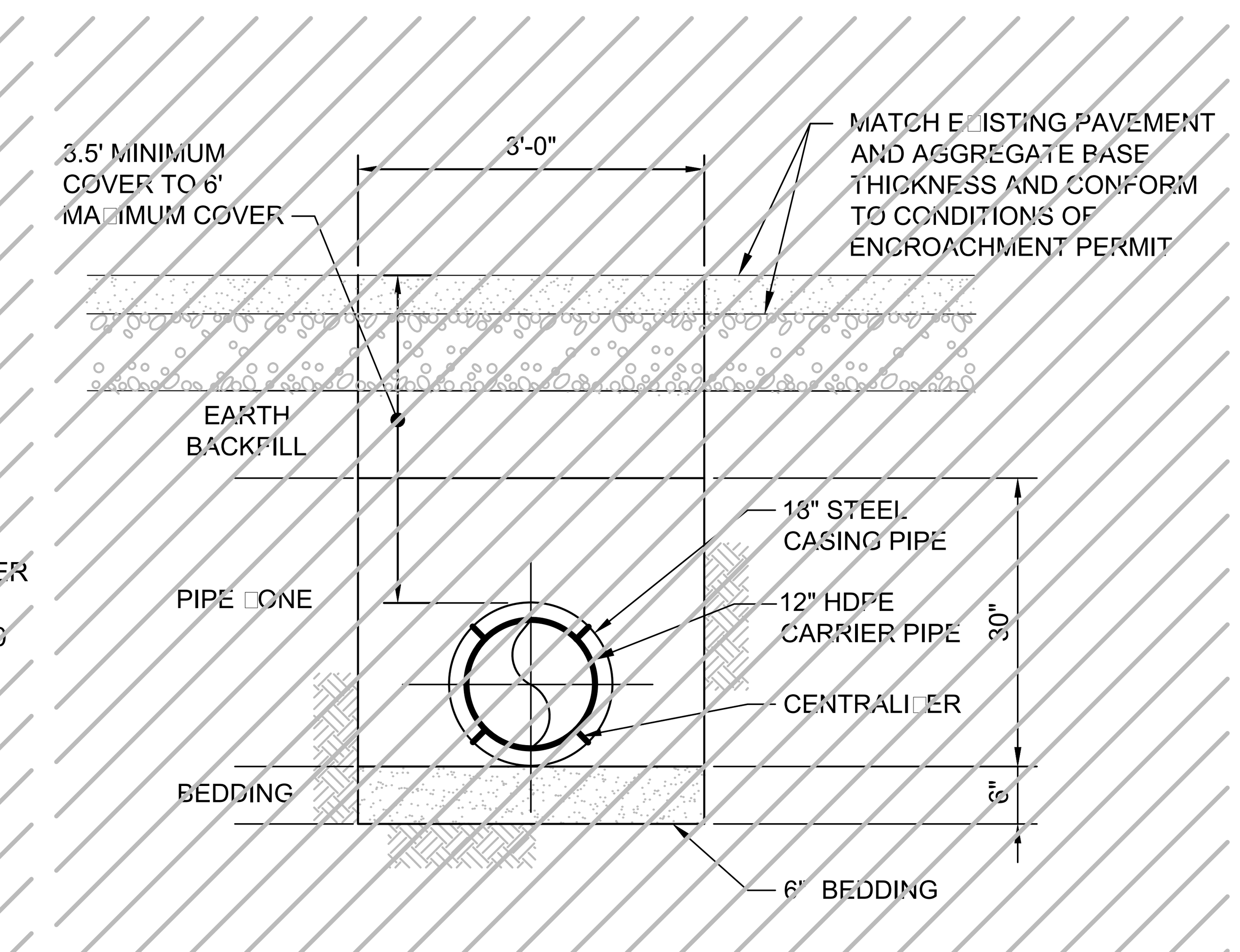


NOTES:
1. IN NON-ROAD AREAS, RESTORE TO MATCH ORIGINAL CONDITION. RESEEDING IS NOT A REQUIREMENT.

B4 SECTION (ROAD SHOULDER OR OPEN FIELD)
3/4" = 1'-0"
C-07-30
C-07-31
C-07-32
C-07-33
C-07-34
C-07-35
C-07-36
C-07-37



B5 SECTION
3/4" = 1'-0"
C-07-30



B6 SECTION
3/4" = 1'-0"
C-07-30

NOTE:
1. REFER TO C-07-03 FOR LOCATION OF EACH PIPELINE SECTION.

90% RESPONSE TO COMMENTS NOTES:

HATCHED SELECTIONS NOT UPDATED FOR THIS SUBMITTAL. TO BE UPDATED FOR 100% SUBMITTAL.

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING
ARCADIS

REVISIONS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
3	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
2	12/30/14	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		MD	PT	VMB	VMB
1	9/8/14	PRE-FINAL (90%) DESIGN		PH	PT	VMB	VMB
0	4/5/13	INTERMEDIATE (60%) DESIGN		PC	PT	VMB	VMB

APPROVED BY		
VMB	SO	
	SUPV	VMB
	DSGN	PT
	DWN	PC
	CHKD	VMB
	OK	VMB
	DATE	09/08/14
	SCALES	3/4"=1'-0"

TOPOCK GROUNDWATER REMEDIATION PROJECT

TRENCH SECTIONS

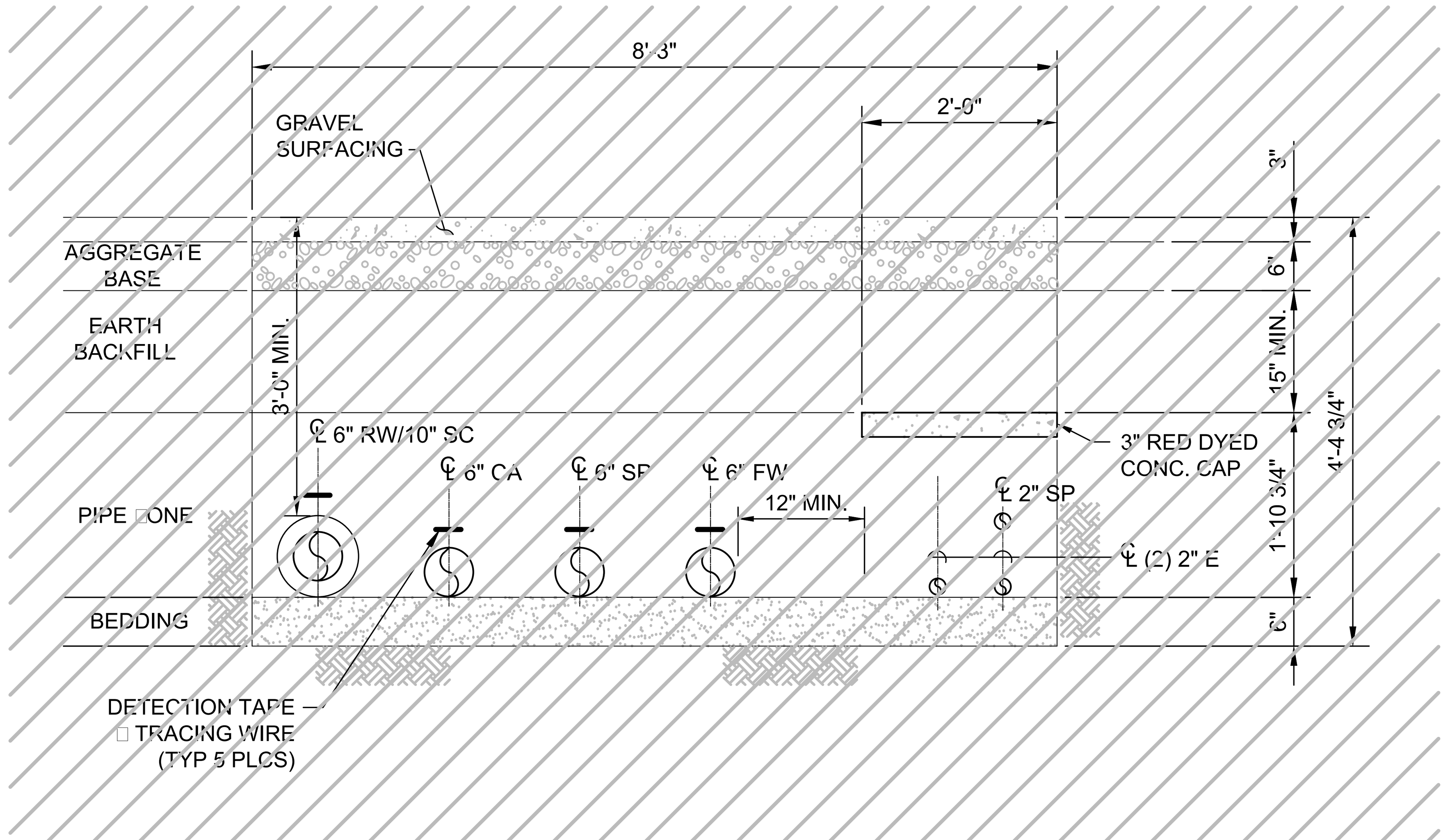
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS

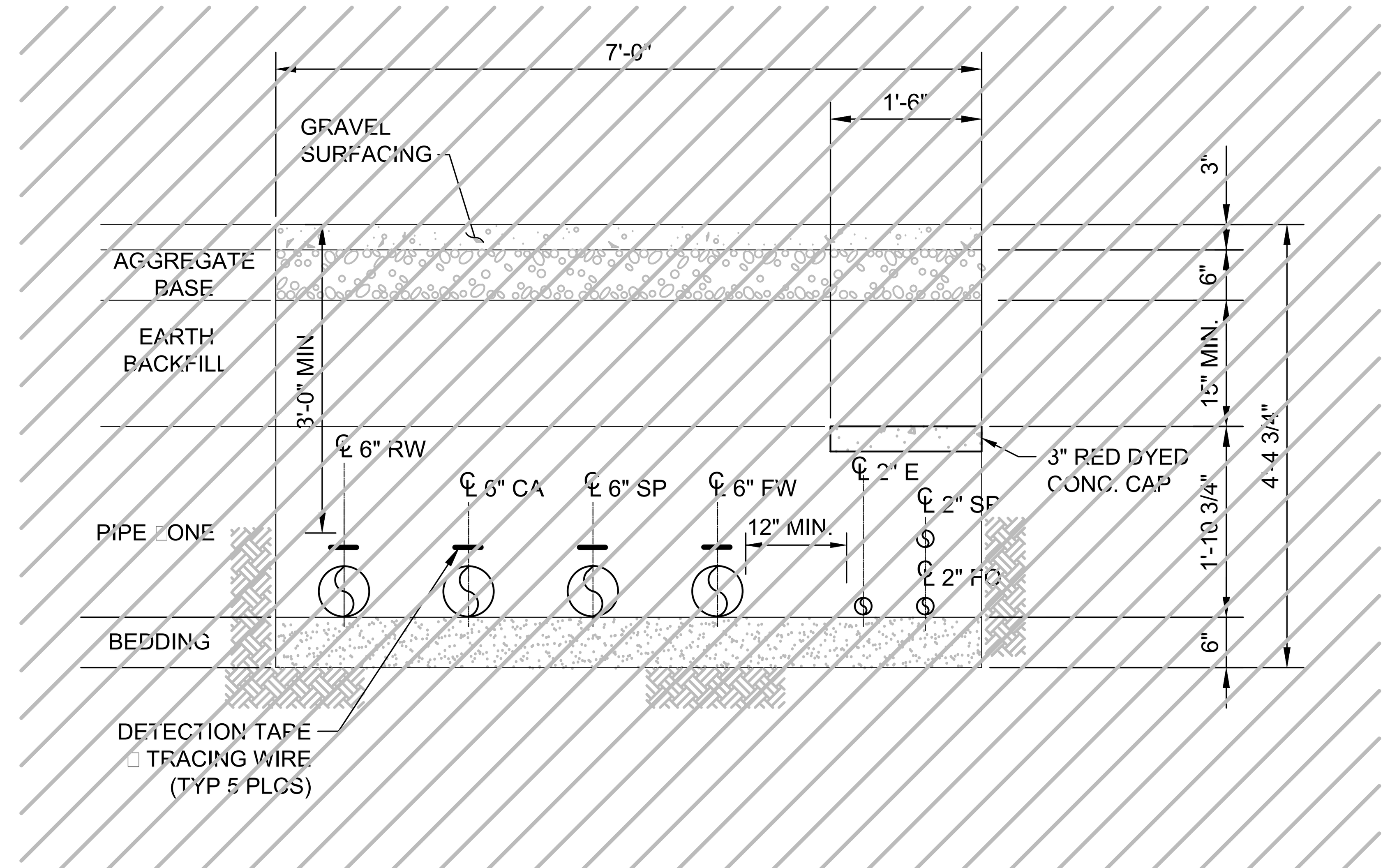
C-07-101 REV 3

N1806

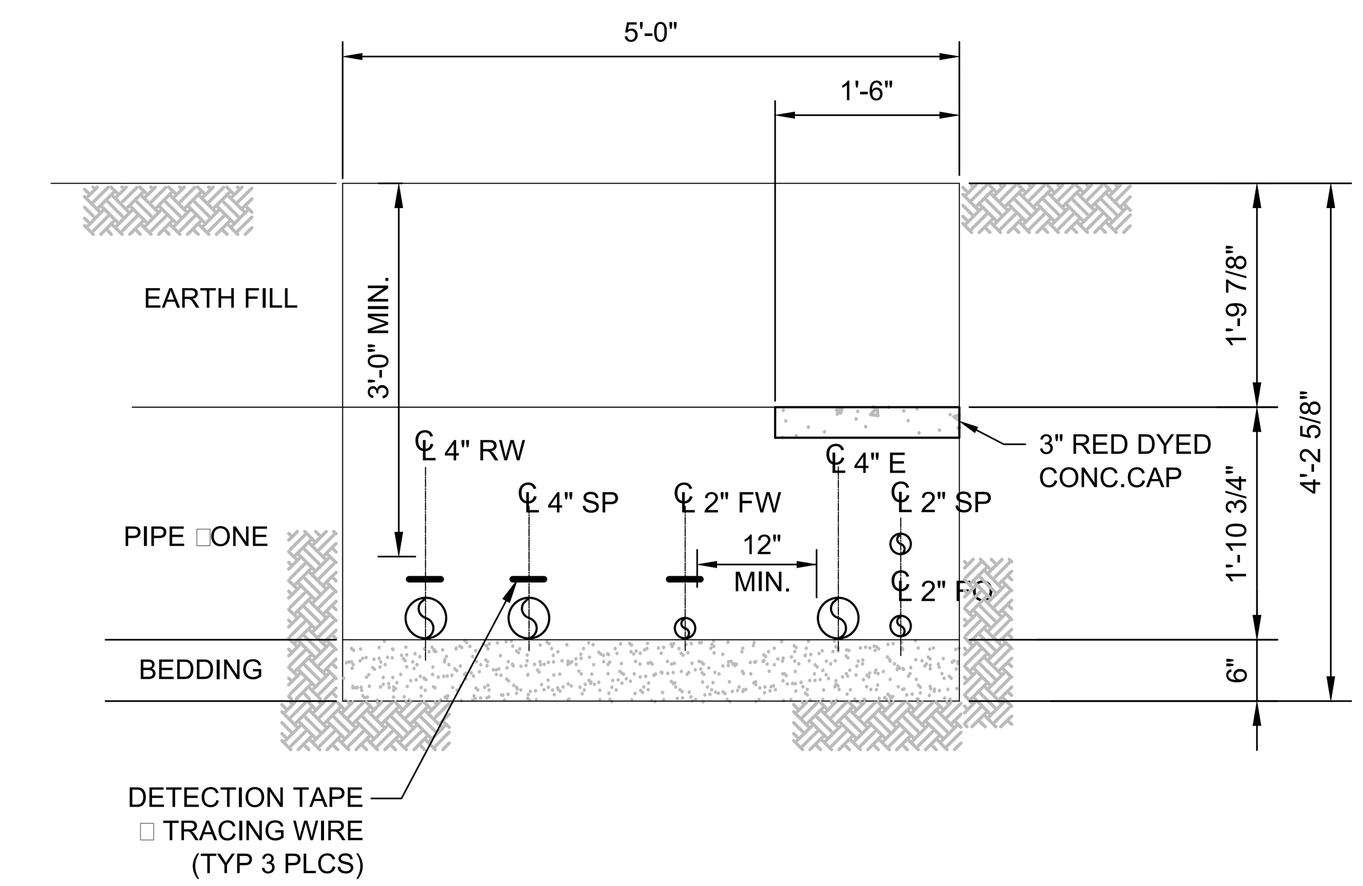
08/05/2015, 11:00, G: ... C-07-101.DWG, T: C-07-101



H1 SECTION
3/4" = 1'-0"
C-07-25

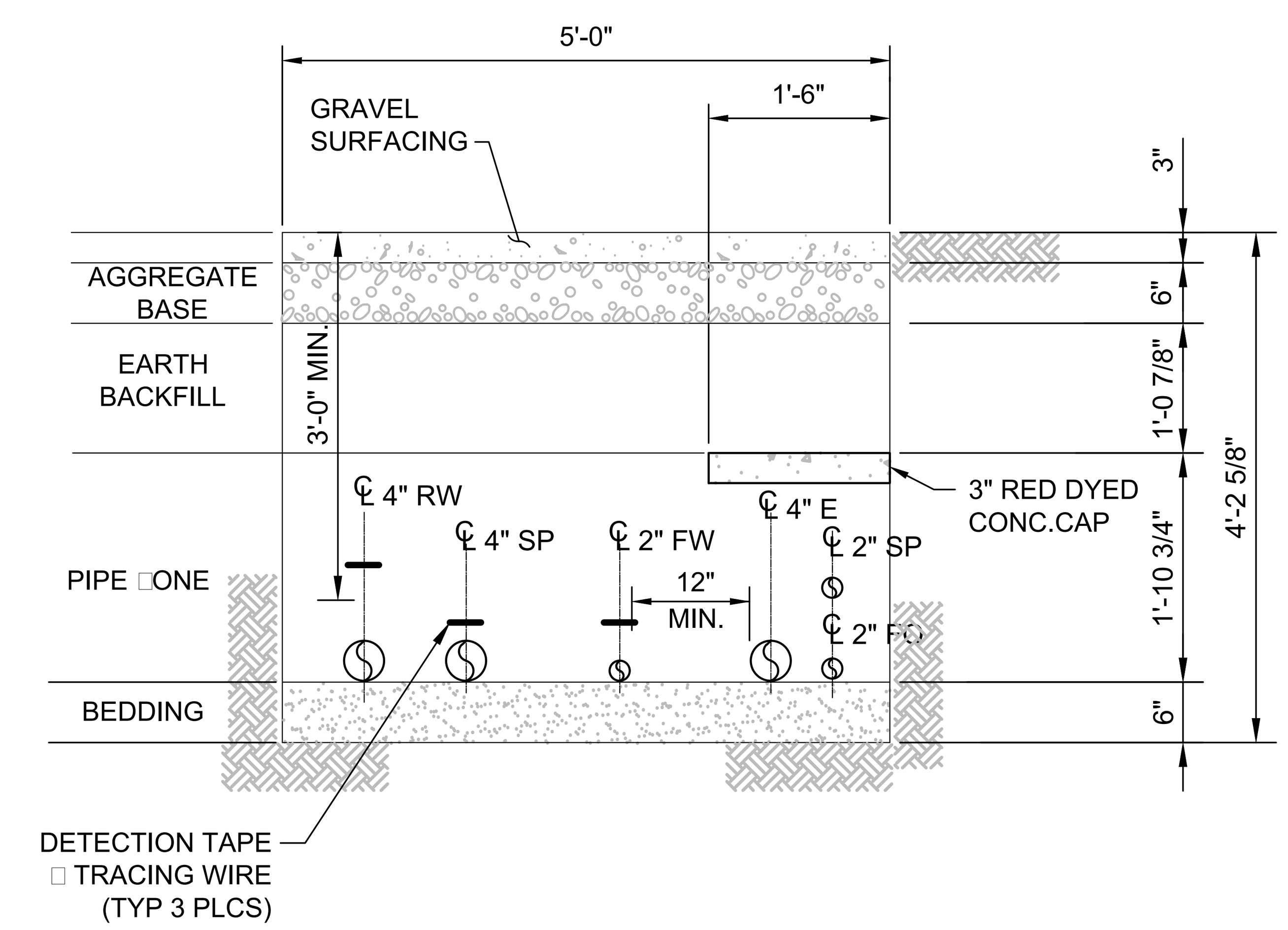


H2 SECTION
3/4" = 1'-0"
C-07-25



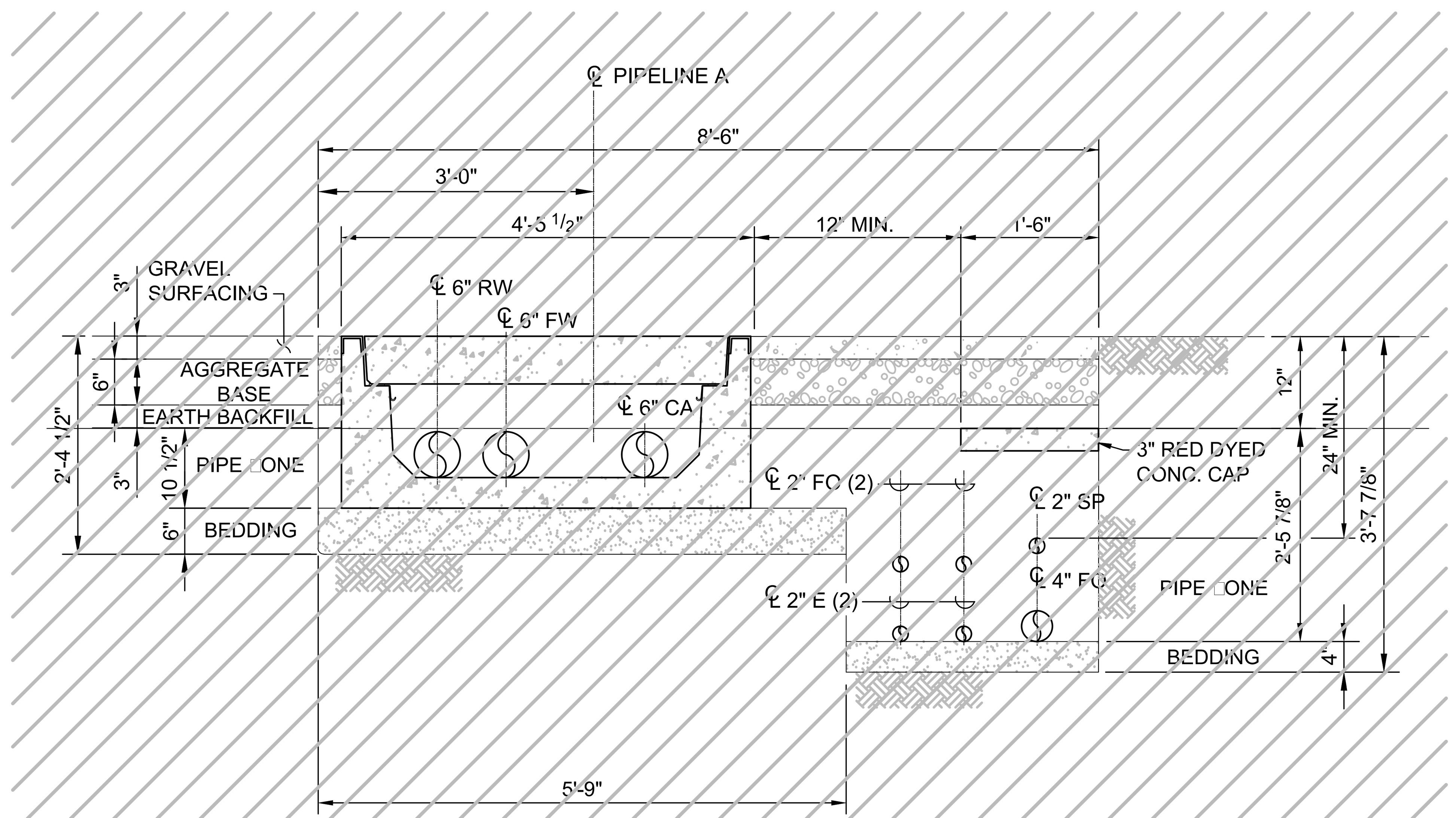
PIPELINE SECTION I1, I3

I1 SECTION (OPEN FIELD)
3/4" = 1'-0"
C-07-79



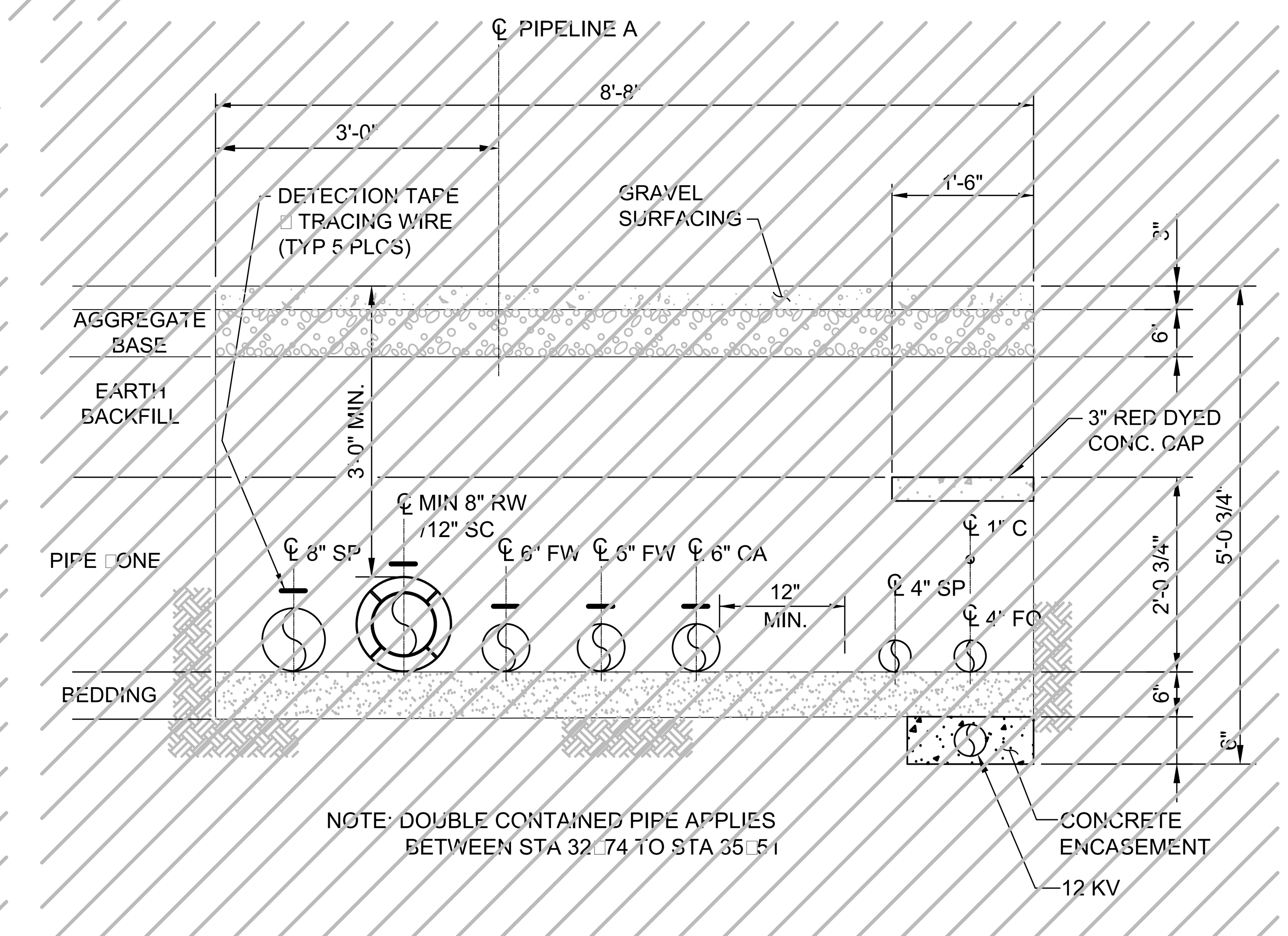
PIPELINE SECTION I1, I3

I1 SECTION (GRAVEL ROAD)
3/4" = 1'-0"
C-07-79



PIPELINE SECTION A8

A8 SECTION
3/4" = 1'-0"
C-07-20
C-07-21



PIPELINE SECTION A10

A10 SECTION
3/4" = 1'-0"
C-07-22
C-07-23

NOTE:

1. REFER TO C-07-03 FOR LOCATION OF EACH PIPELINE SECTION.

90% RESPONSE TO COMMENTS NOTES:

HATCHED SELECTIONS NOT UPDATED FOR THIS SUBMITTAL. TO BE UPDATED FOR 100% SUBMITTAL.

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
3	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
2	12/30/14	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		MD	PT	VMB	VMB
1	9/8/14	PRE-FINAL (90%) DESIGN		PH	PT	VMB	VMB
0	4/5/13	INTERMEDIATE (30%) DESIGN		PC	PT	VMB	VMB

REVISIONS

APPROVED BY	
SO	
SUPV	VMB
DSGN	PT
DWN	PC
CHKD	VMB
OK	VMB
DATE	12/30/14
SCALES	3/4"=1'-0"

TOPOCK GROUNDWATER REMEDIATION PROJECT

PIPELINE SECTIONS

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-07-102 REV 3

08/05/2015, 14:05, G: ... AR TOPOCK-01 ... 100% DWG\C-C... C-07-102.DWG, T... C-07-102

Attachment D: RTC #72, #995

Construction Sequencing Details

Year	2015	2016				2017				2018				2019				2020				2021			
Quarter	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Current Sequence	100% Design Complete	Complete SEIR and Outreach/Public Participation Activities					Pre-Construction and System Construction											Shutdown IM-3 and Start-up NTH IRZ				Start-up Freshwater Wells		Start-up Riverbank IRL and TCS/East Ravine Systems	
Alternate Sequence	100% Design Complete	Complete SEIR and Outreach/Public Participation Activities					Pre-Construction and NTH IRZ System Construction							Shutdown IM-3 and Start-up NTH IRZ				Complete Construction of Remaining Systems and Incorporate Data				Start-up Freshwater Wells		Start-up Riverbank IRL and TCS/East Ravine Systems	
Quarter	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Year	2015	2016				2017				2018				2019				2020				2021			

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

PROPOSED ALTERNATE FINAL GROUNDWATER REMEDY CONSTRUCTION SEQUENCE SCHEDULE

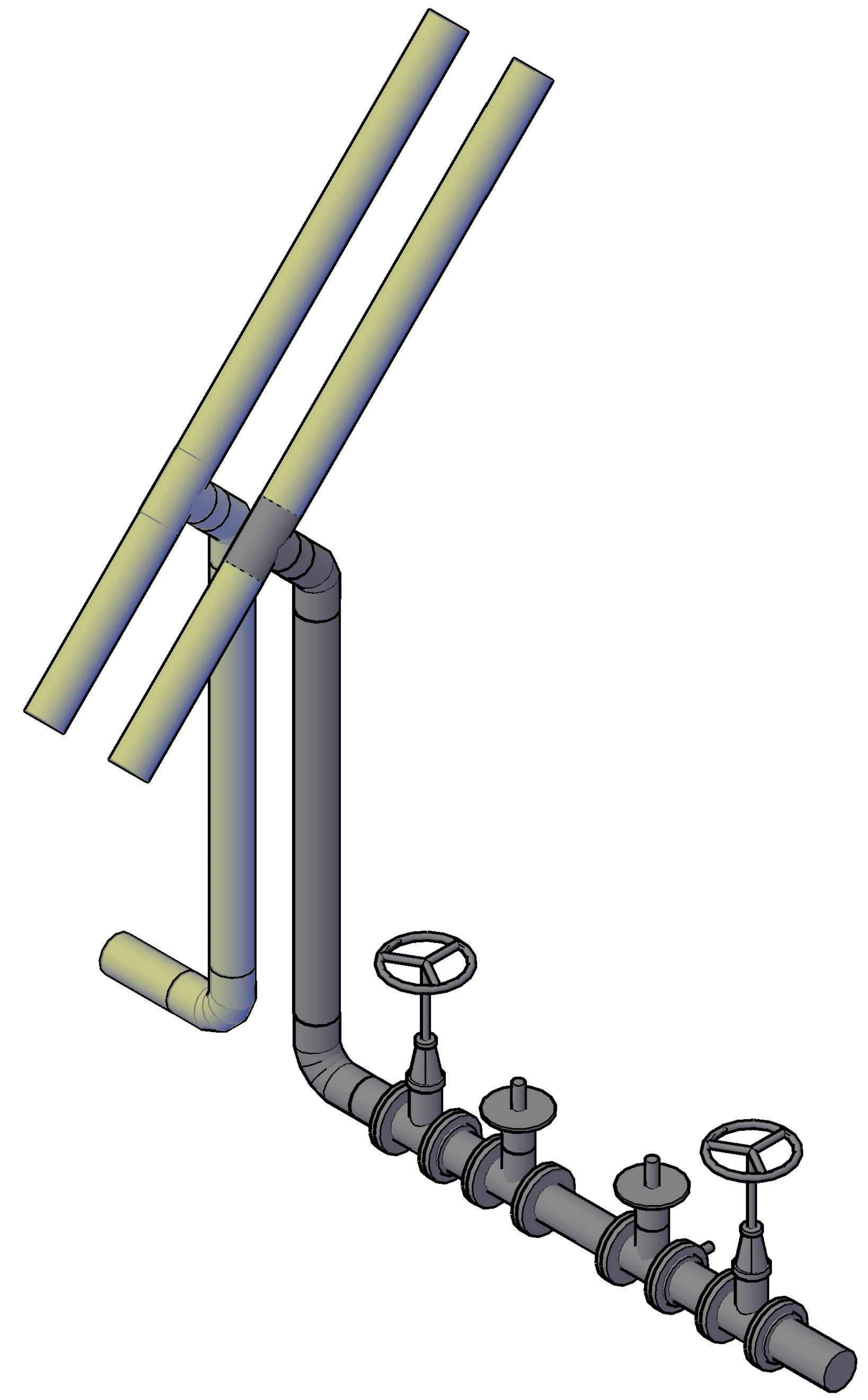
ARCADIS
Infrastructure · Water · Environment · Buildings

FIGURE
1

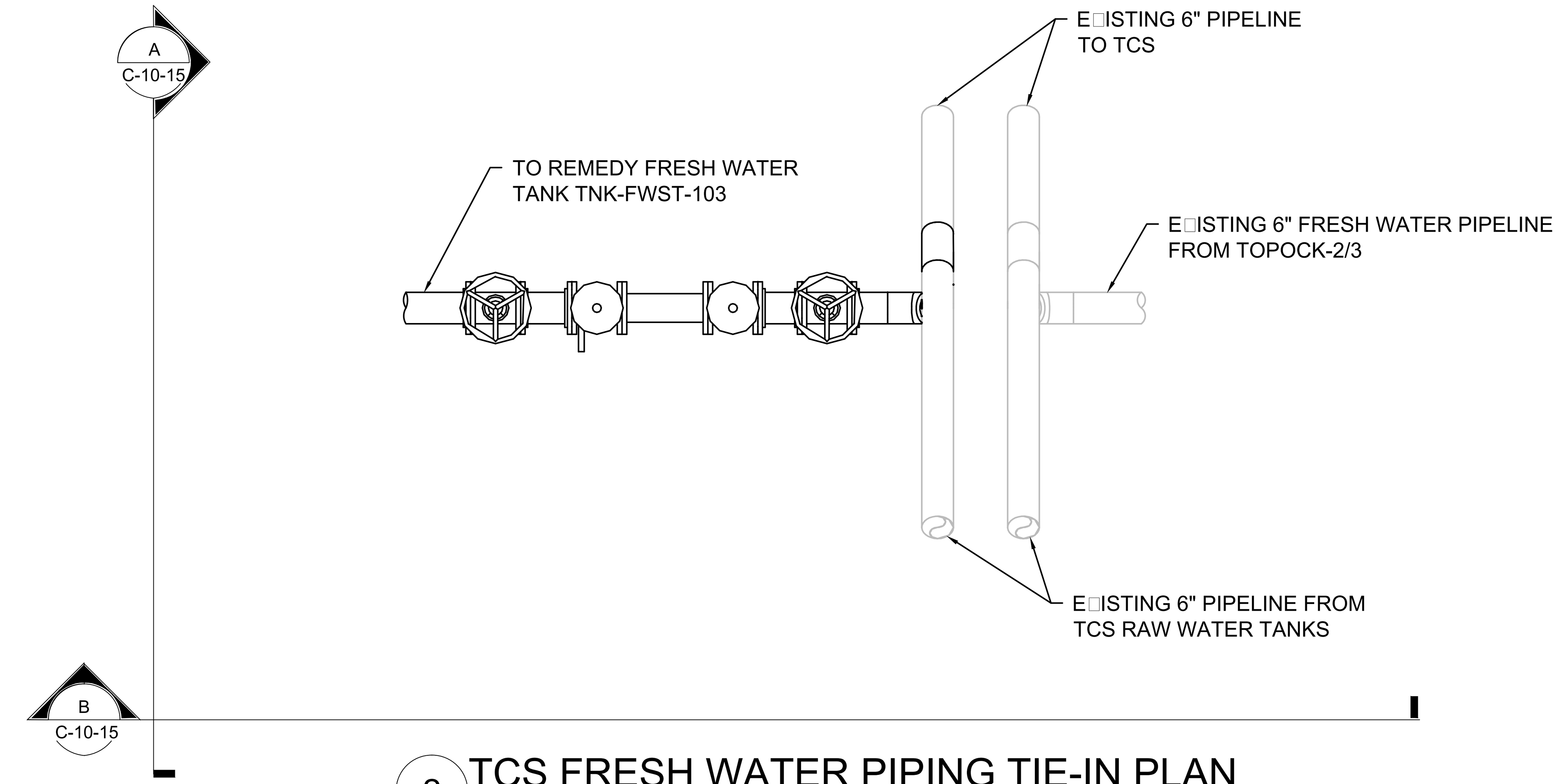
Attachment E: RTCs #135, #267, #300

Details on Tie-in of Topock-2/3 Wells

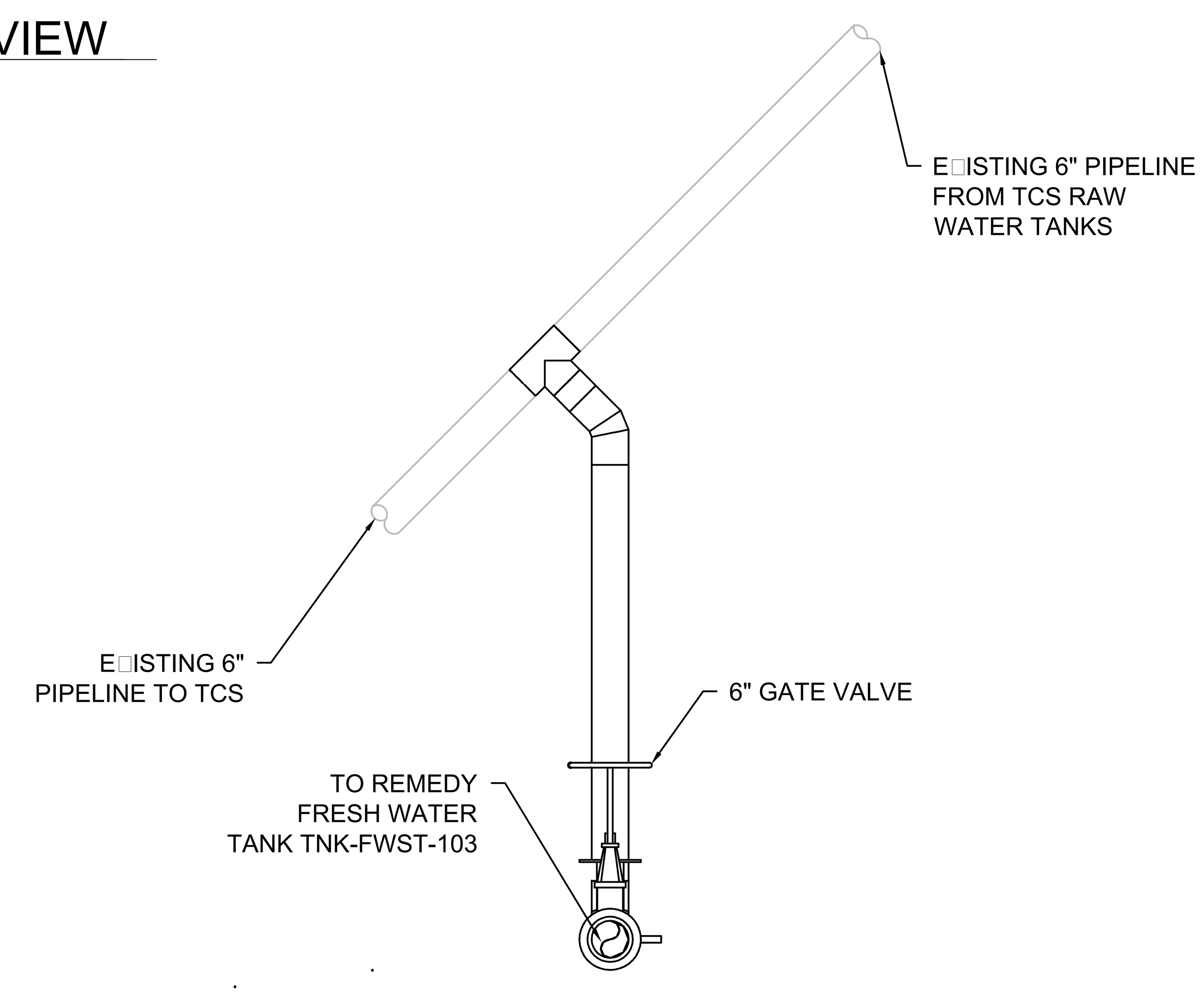
The final design will address DTSC's comment and will include the design of the piping from the gate valves to the remedy fresh water tank in both map and section view.



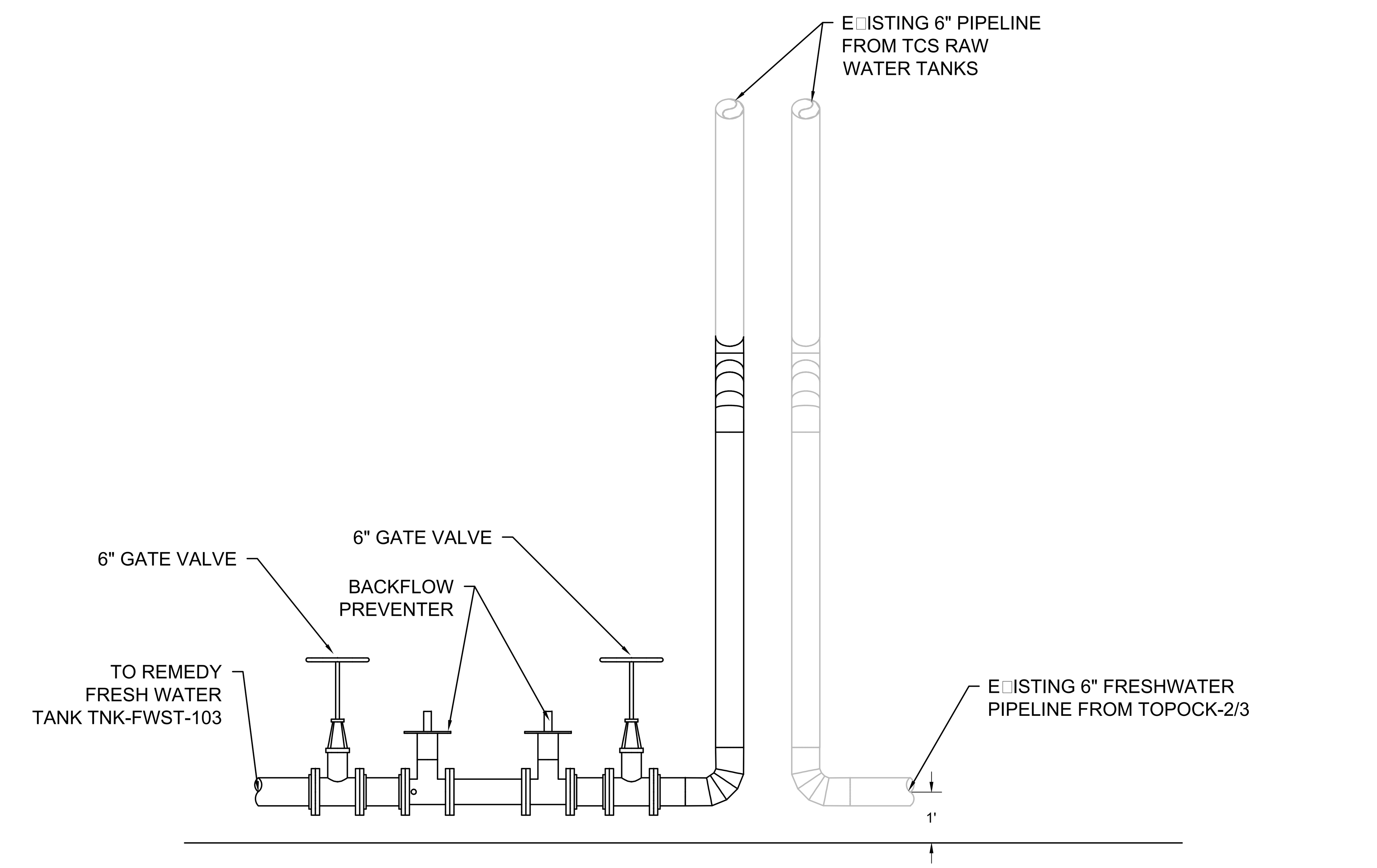
1 PIPING ISOMETRIC VIEW
1/2" = 1'-0"
C-10-11



2 TCS FRESH WATER PIPING TIE-IN PLAN
1/2" = 1'-0"
C-10-15



A SECTION
1/2" = 1'-0"
C-10-15



B SECTION
1/2" = 1'-0"
C-10-15

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY		
SO		
SUPV	VMB	
DSGN	PT	
DWN	PH	
CHKD	VMB	
OK	VMB	
DATE	8/5/15	
SCALES	1"=5'-0"	

TOPOCK GROUNDWATER REMEDIATION PROJECT

FRESHWATER TIE-IN TO TOPOCK-2/3 AT TCS

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	REV
C-10-15	0

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N1808

Attachment F: RTC #140

Figure 3 of 60% BOD Appendix M and Figure 5 of 90% BOD Appendix M

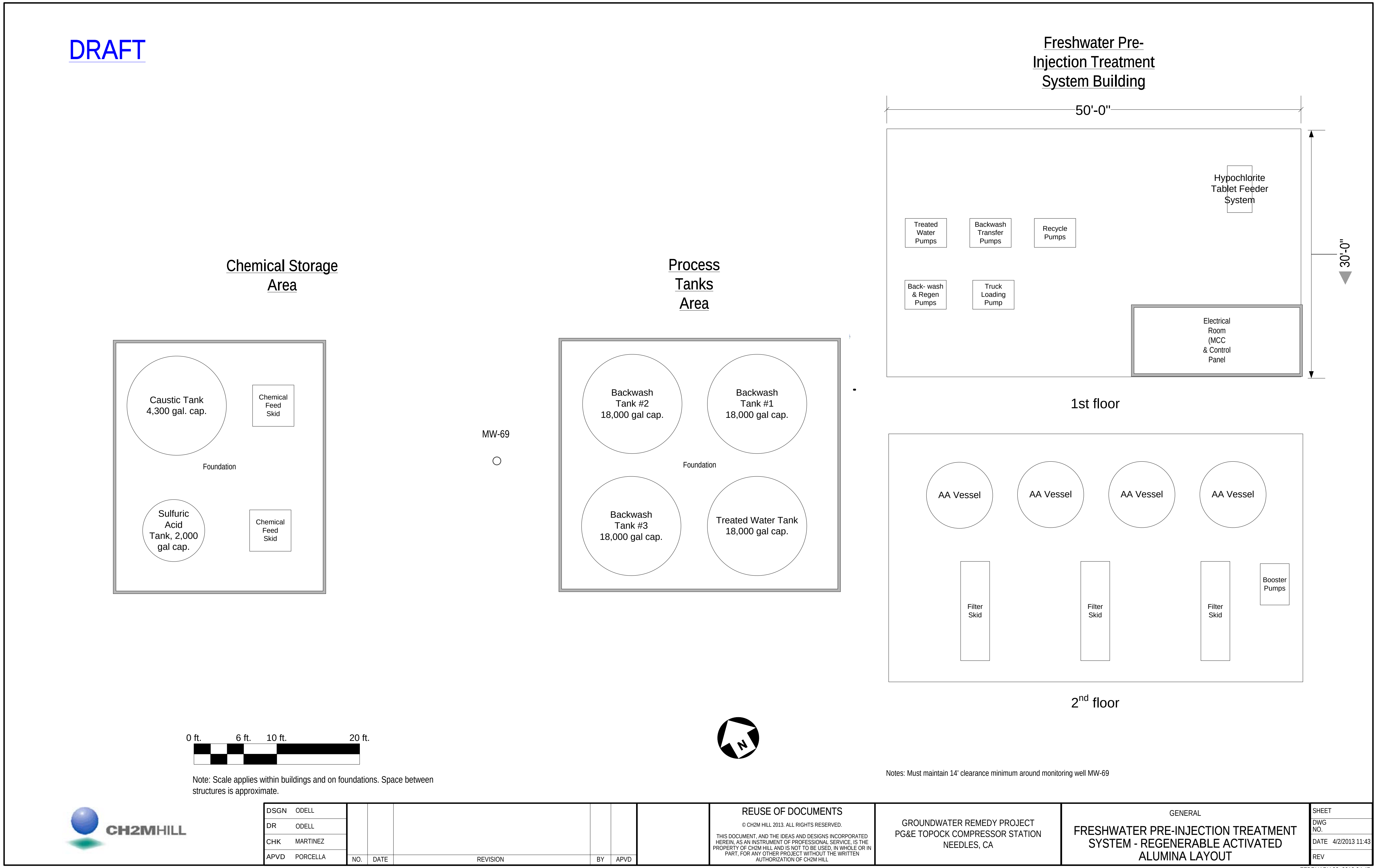


FIGURE 3
Equipment Layout

60% BOD, Appendix M

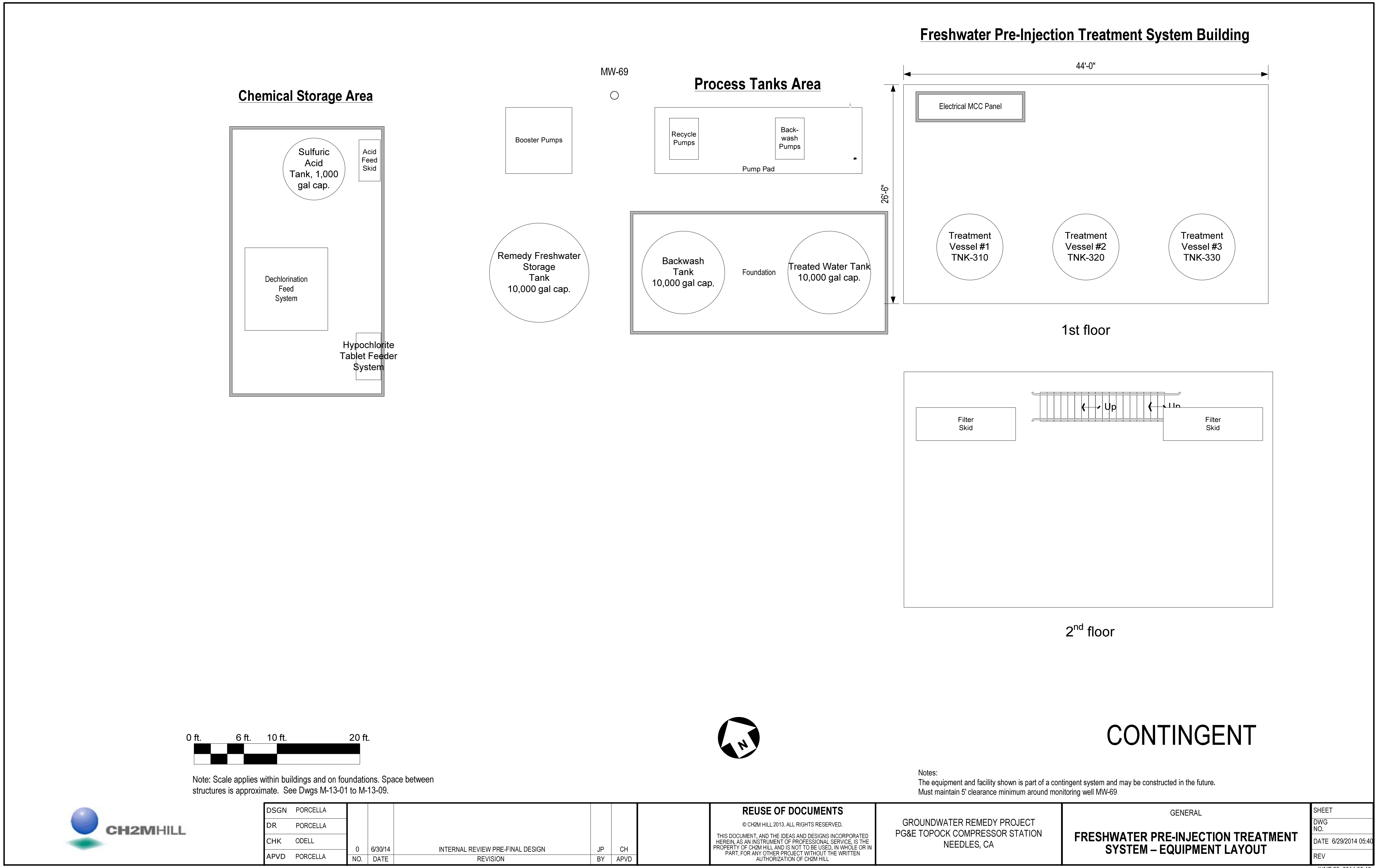


FIGURE 5
Equipment Layout
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum
PG&E Topock Compressor Station, Needles, California

90% BOD, Appendix M

Attachment G: RTC #196

Revised Figure 2.1-1 of the 90% BOD Section 2

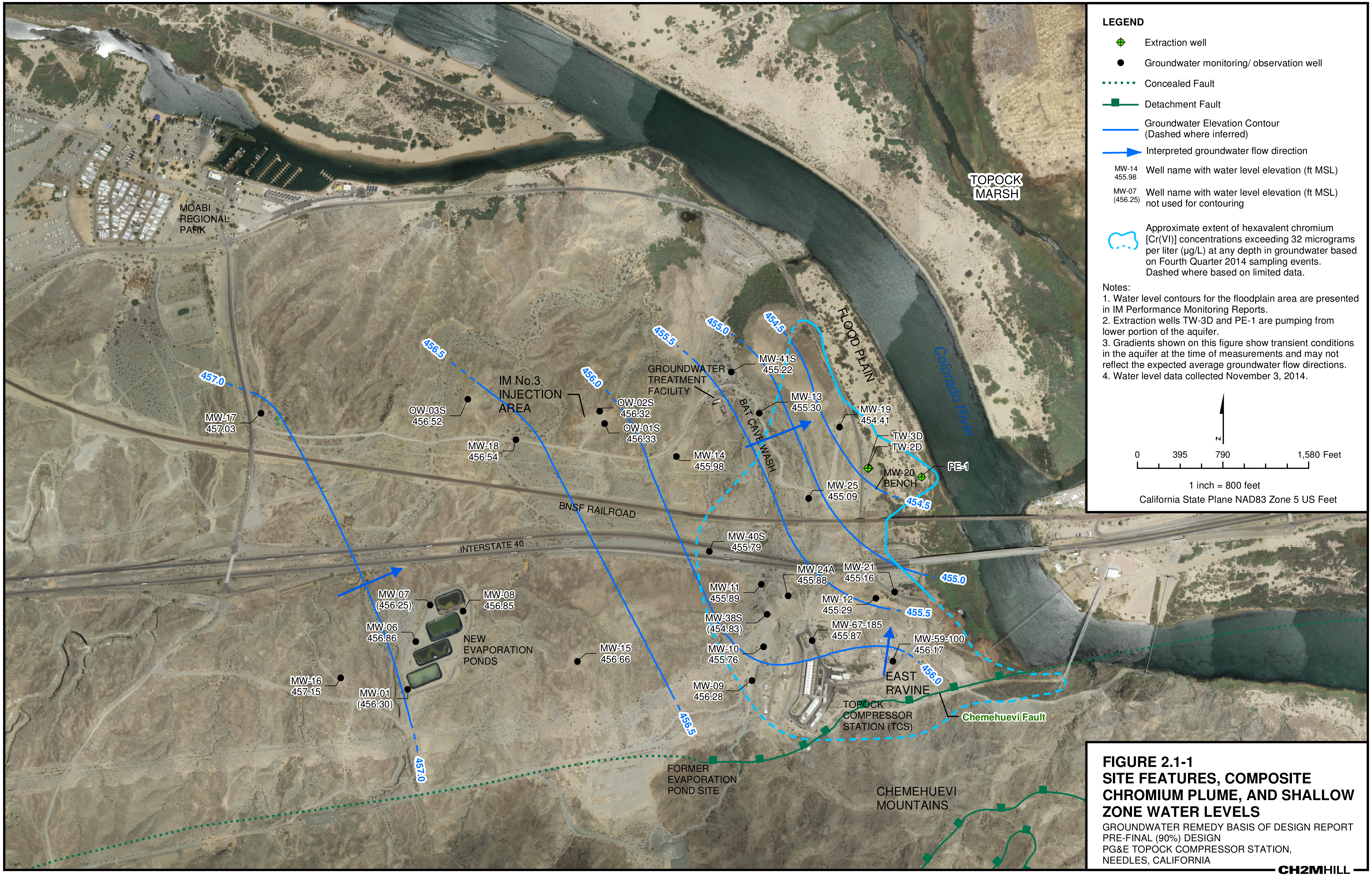


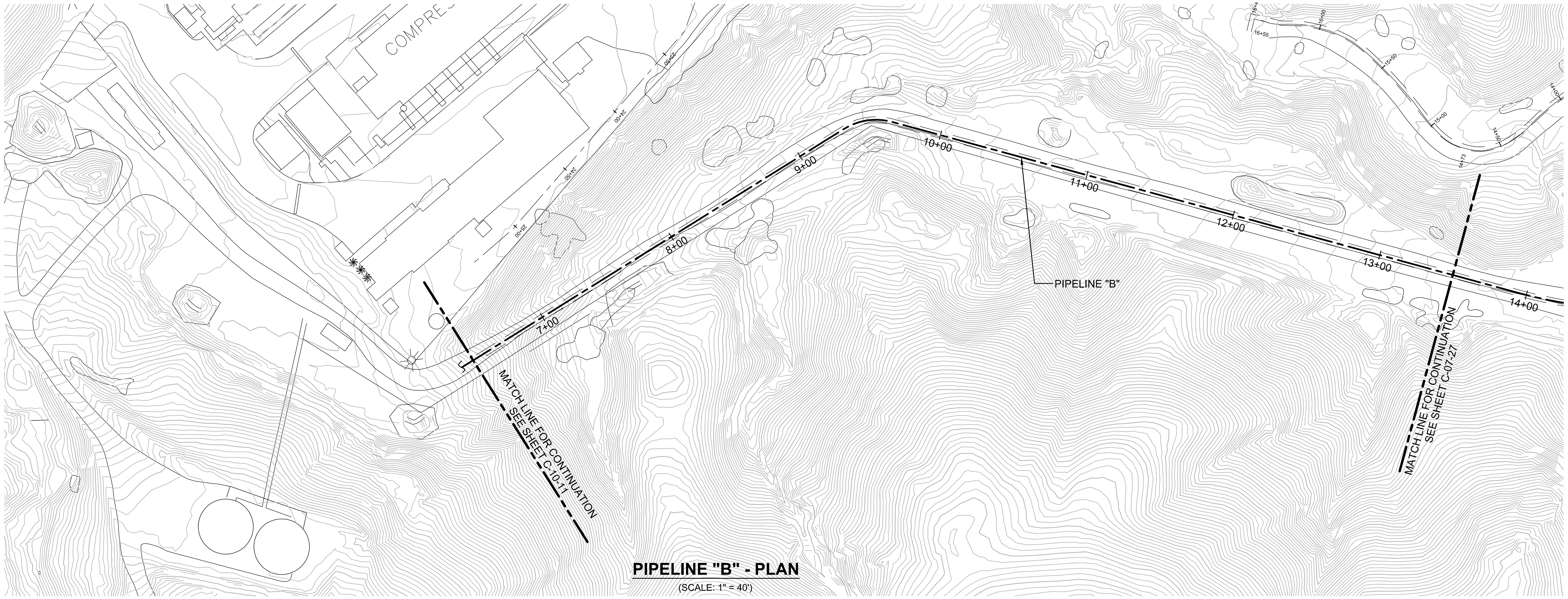
FIGURE 2.1-1
SITE FEATURES, COMPOSITE CHROMIUM PLUME, AND SHALLOW ZONE WATER LEVELS
GROUNDWATER REMEDY BASIS OF DESIGN REPORT
PRE-FINAL (90%) DESIGN
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA
CH2MHILL

Attachment H: RTC #223

Photos of a 500-1,000 gallon portable tank being pulled by a pickup truck

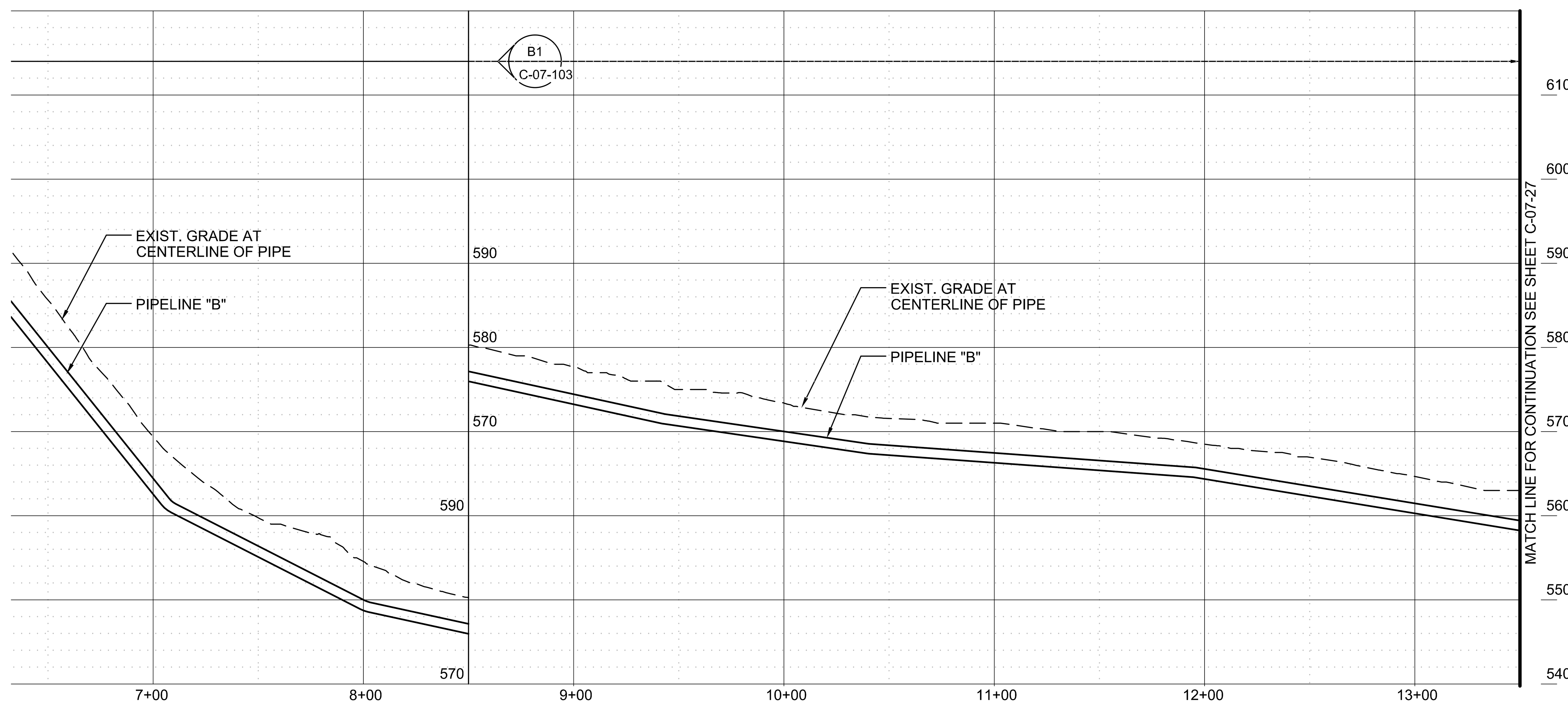
Attachment I: RTC #296

Design of New 12-inch Freshwater Pipe for Use if Pre-treatment is Required



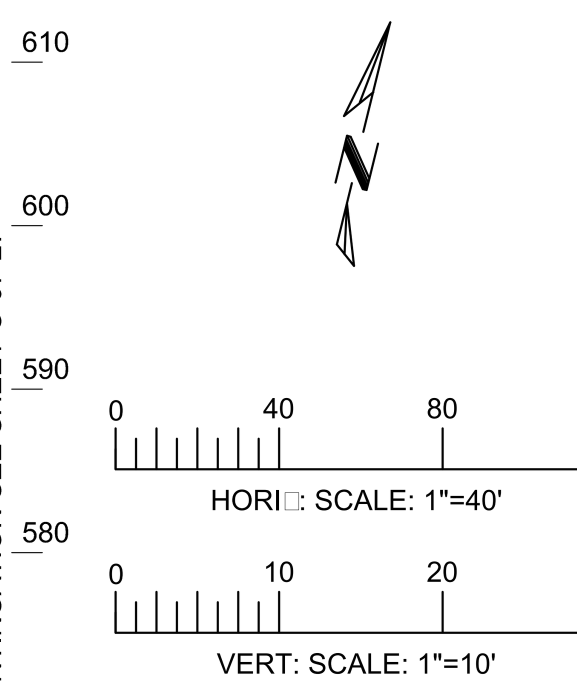
PIPELINE "B" - PLAN

(SCALE: 1" = 40')



PIPELINE "B" - PROFILE

(SCALE: 1" = 40' H; 1" = 10' V)



- DRAFT -
NOT FOR CONSTRUCTION

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
1	9/8/14	PRE-FINAL 90% DESIGN					
0	4/5/13	INTERMEDIATE 60% DESIGN		-	-	-	-

REVISIONS

APPROVED BY	-
SO	XXXXX
SUPV	PD
DSGN	GO
DWN	LD
CHKD	JM
OK	PD
DATE	9/8/14
SCALES	1" = 40'-0"

TOPOCK GROUNDWATER REMEDIATION PROJECT

PLAN AND PROFILE PIPELINE "B" STA 3+05 TO STA 13+50

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
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SHEET NO. of SHEETS
C-07-26 REV 2

ETIC ENGINEERING
ARCADIS

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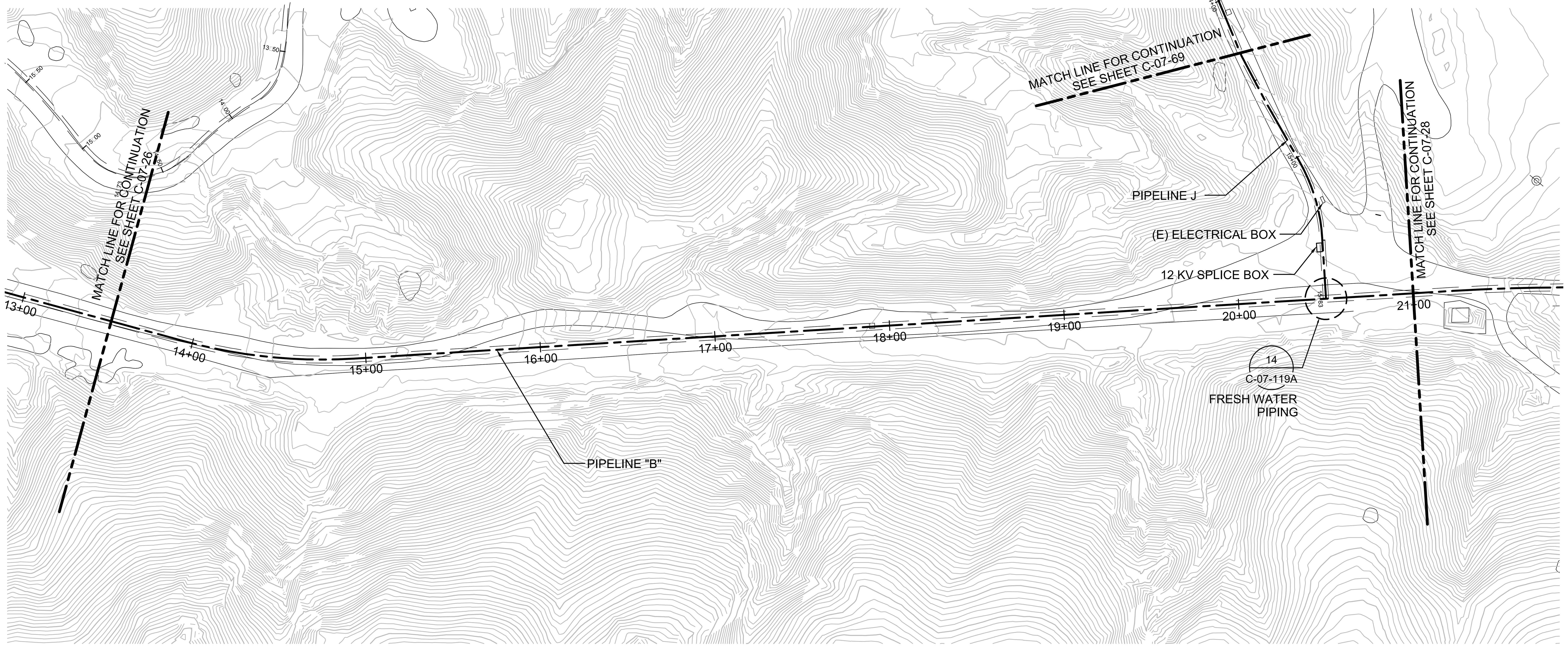
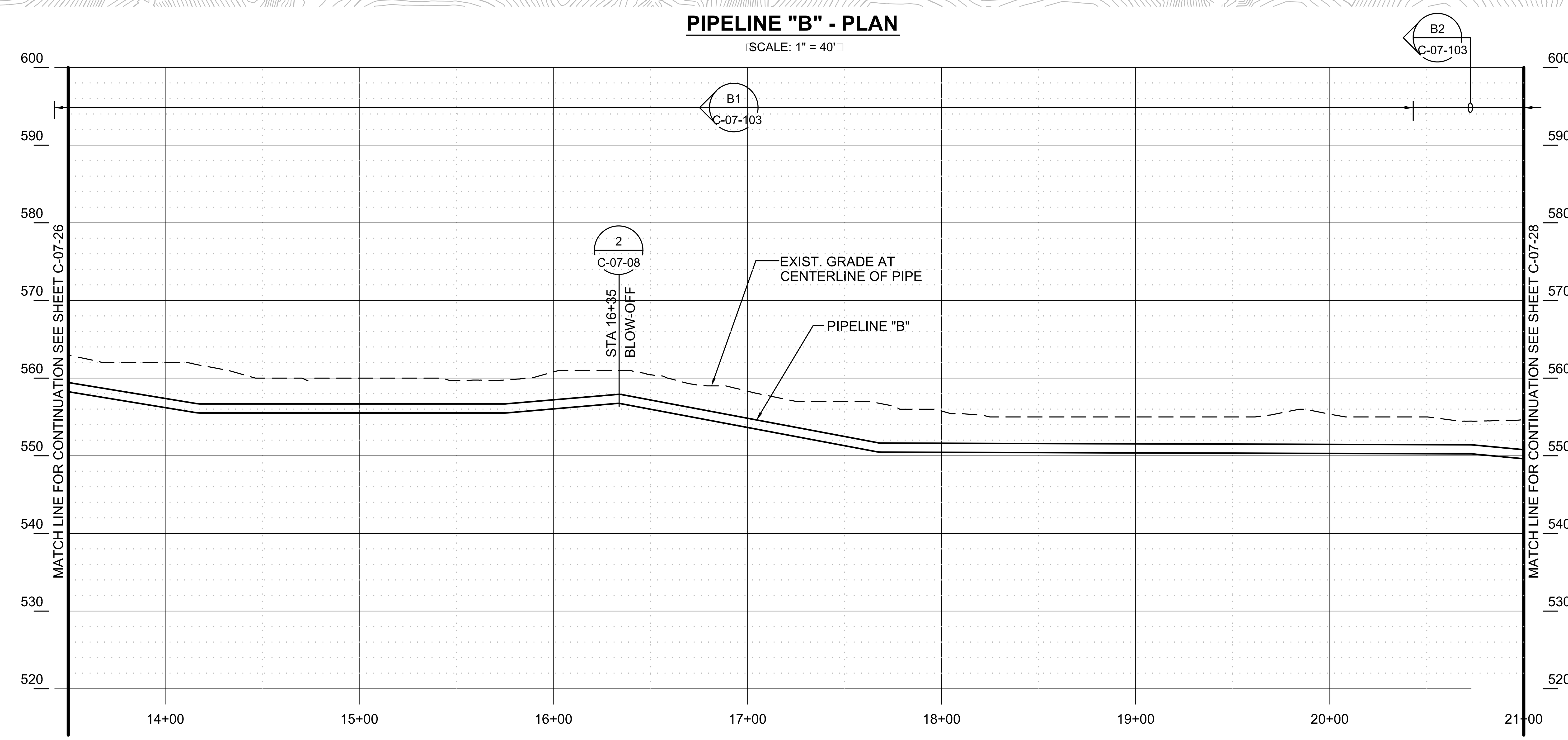


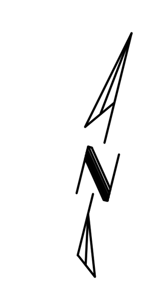
PIPELINE "B" - PLAN

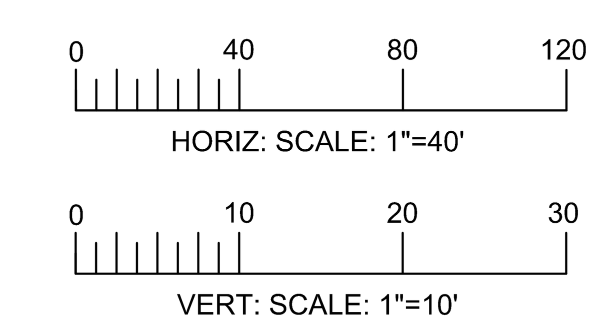
(SCALE: 1" = 40')



PIPELINE "B" - PROFILE

(SCALE: 1" = 40' H, 1" = 10' V)





- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
1	9/8/14	PRE-FINAL (90%) DESIGN		-	-	-	-
0	4/5/13	INTERMEDIATE (60%) DESIGN		-	-	-	-

REVISIONS

APPROVED BY	
SO	XXXXX
SUPV	PD
DSGN	GO
DWN	LD
CHKD	JM
OK	PD
DATE	9/8/14
SCALES	1" = 40'-0"

TOPOCK GROUNDWATER REMEDIATION PROJECT

PLAN AND PROFILE
PIPELINE "B"
STA 13+50 TO STA 21+00

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS

C-07-27 REV 1

H1808

NOTES:
1. 12KV SPLICE BOX PER PG E STANDARD 062000, HEAV FULL TRAFFIC, 3' 4'X4'-6" INSIDE DIMENSIONS.
2. 480V HANDHOLE PER PG E STANDARD 062000, HEAV FULL TRAFFIC, 3' 5' 3'-6" INSIDE DIMENSIONS.

PIPELINE "J" - PLAN

SCALE: 1" = 20'

PIPELINE "J" - PROFILE

SCALE: 1" = 20' H 1" = 5' V

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
1	9/8/14	PRE-FINAL 90% DESIGN					
0	4/5/13	INTERMEDIATE 60% DESIGN		-	-	-	-

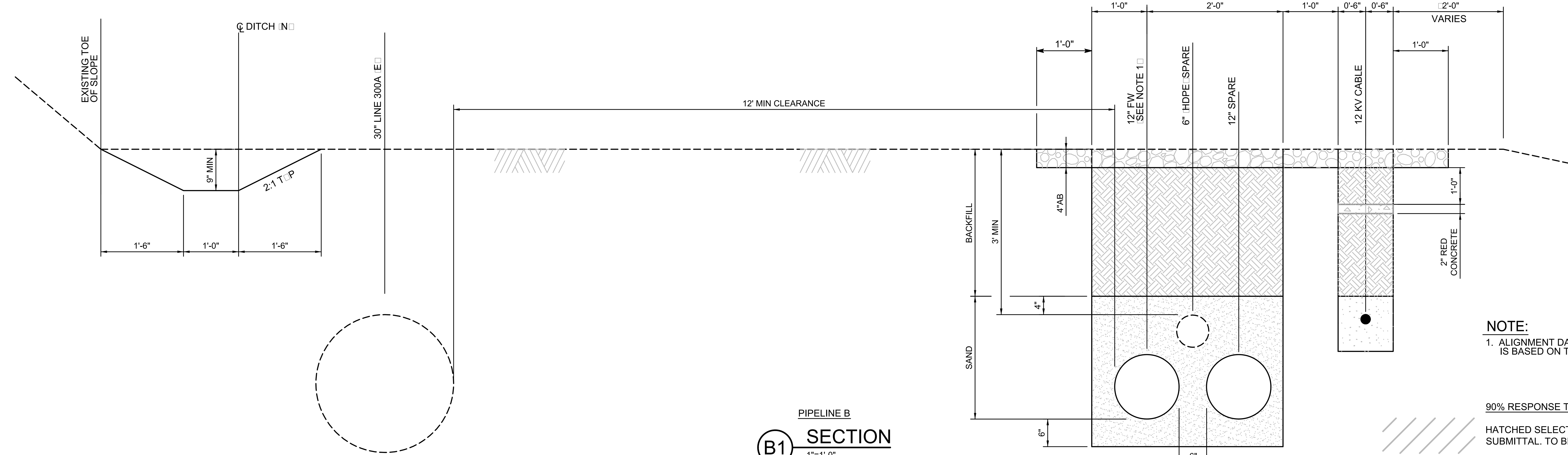
REVISIONS

APPROVED BY		
-	SO	XXXXX
	SUPV	PD
	DSGN	GO
	DWN	LD
	CHKD	JM
	OK	PD
	DATE	9/8/14
	SCALES	1" = 20'-0"

TOPOCK GROUNDWATER REMEDIATION PROJECT
PLAN AND PROFILE
PIPELINE "J"
STA 10 04 TO STA 15 83
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
C-07-69	REV 1

N1808



PIPELINE B

B1 SECTION

1"=1'-0"

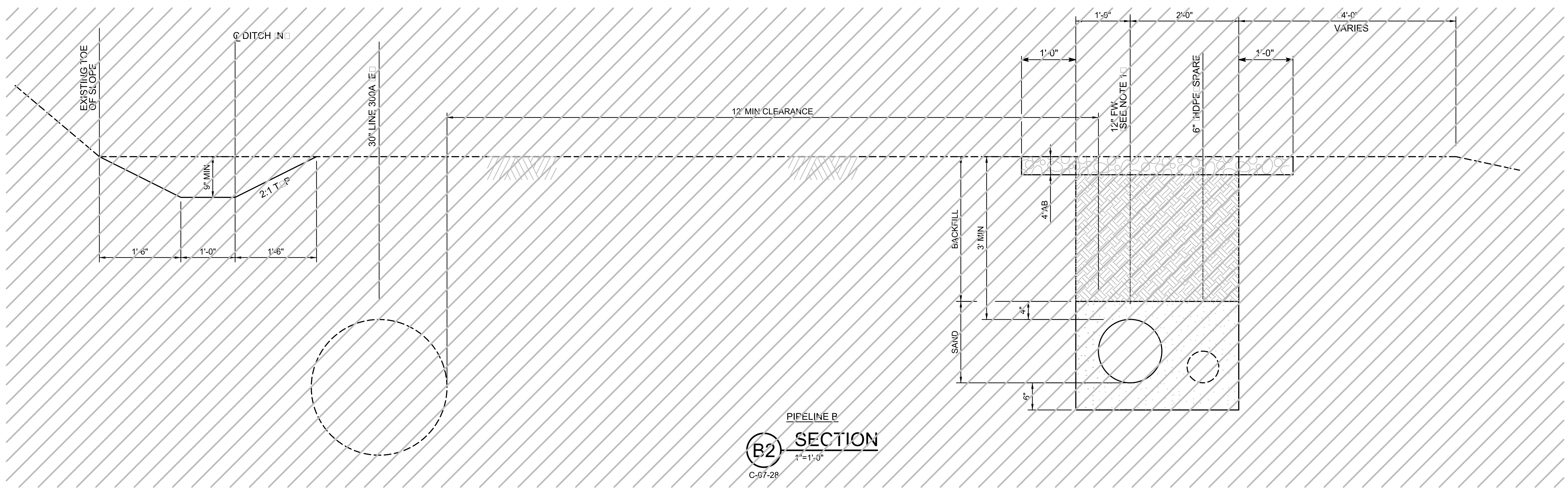
C-07-26
C-07-27

NOTE:

1. ALIGNMENT DATA SHOWN ON PLAN IS BASED ON THIS PIPE.

90% RESPONSE TO COMMENTS NOTES:

HATCHED SELECTIONS NOT UPDATED FOR THIS SUBMITTAL. TO BE UPDATED FOR 100% SUBMITTAL.



PIPELINE B

B2 SECTION

1"=1'-0"

C-07-28

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NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
1	9/8/14	PRE-FINAL (90%) DESIGN					
0	4/5/13	INTERMEDIATE (60%) DESIGN		-	-	-	-

REVISIONS

APPROVED BY		
-	SO	XXXXX
	SUPV	PD
	DSGN	TL
	DWN	TL
	CHKD	JM
	OK	PD
	DATE	9/8/14
	SCALES	1" = 1'-0"

TOPOCK GROUNDWATER REMEDIATION PROJECT

PIPELINE SECTIONS

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
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SHEET NO. of SHEETS	
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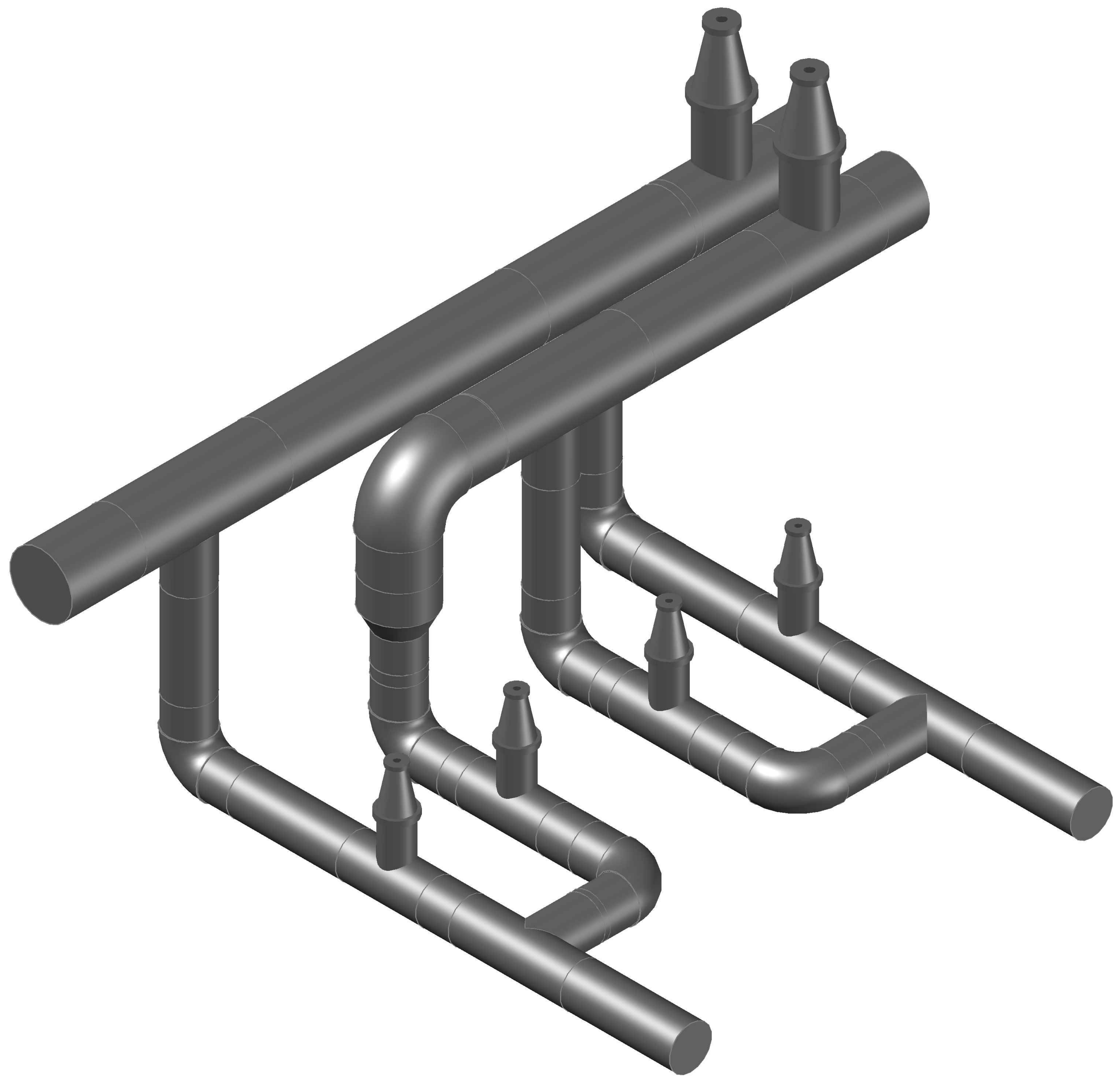
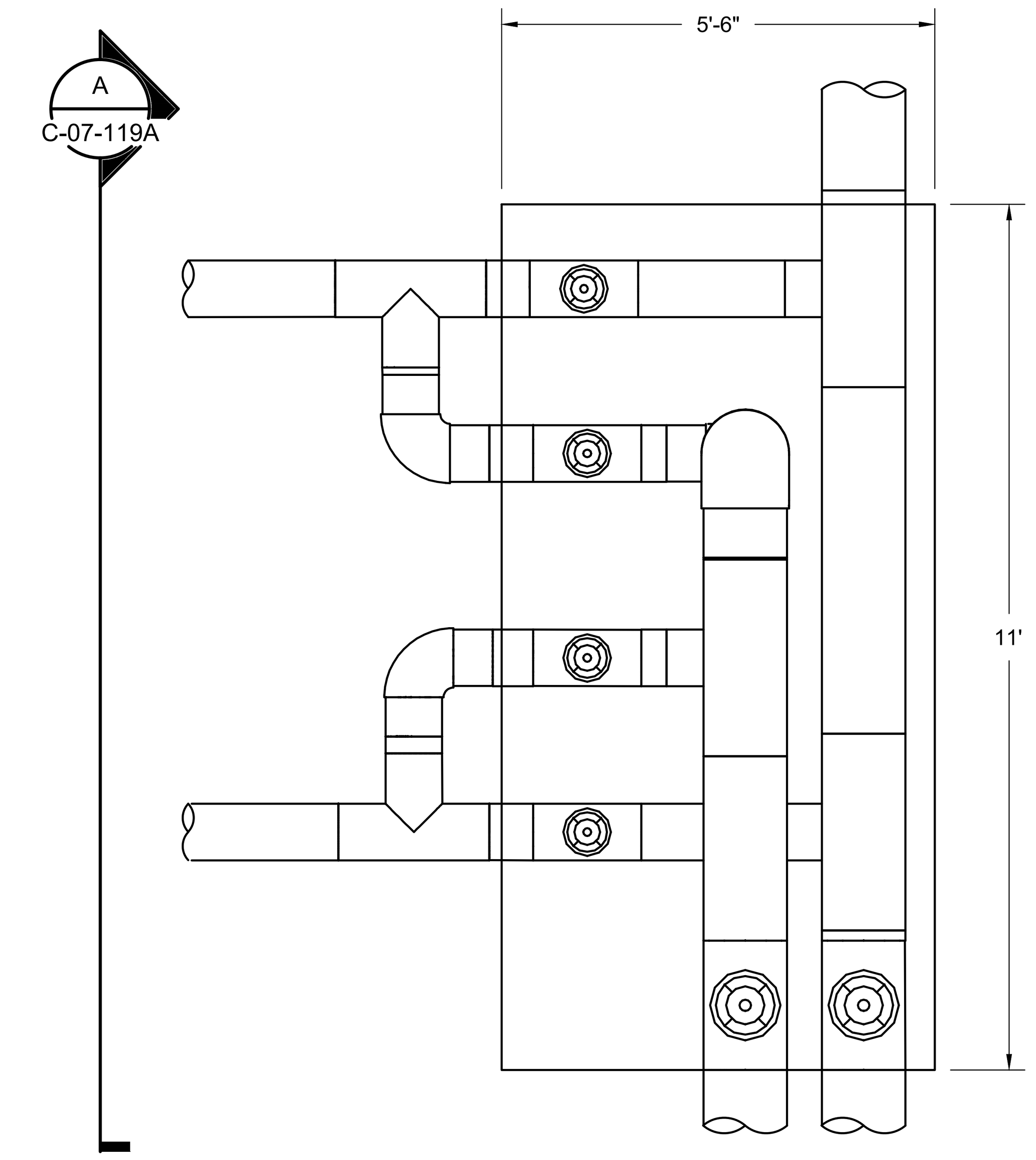
H1808



(14) FRESH WATER PIPING ISOMETRIC VIEW

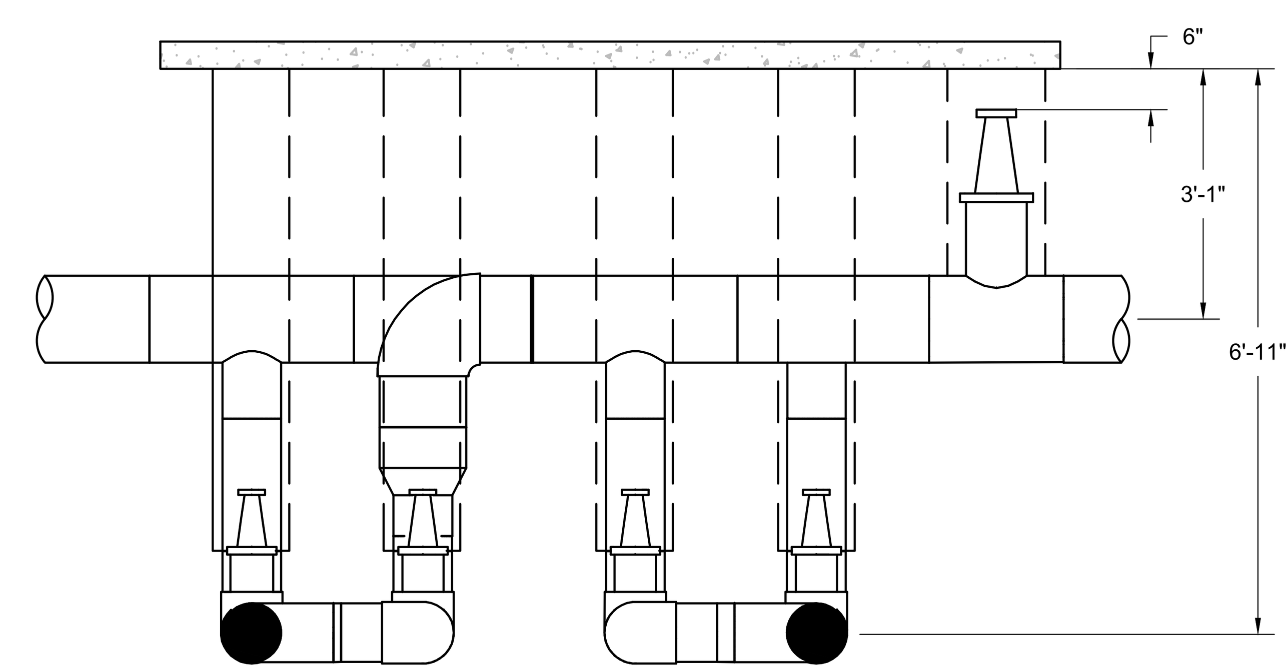
3/4" = 1'-0"

C-07-119A



FRESH WATER PIPING ENLARGED

1/2" = 1'-0"



(A) SECTION

1/2" = 1'-0"

C-07-119A

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NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY

REVISIONS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY	
SO	
SUPV	
DSGN	
DWN	
CHKD	
OK	
DATE	8/5/15
SCALES	

TOPOCK GROUNDWATER REMEDIATION PROJECT

DETAIL FOR THE FW CONNECTION

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-07-119A
REV 0

H1808

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- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
1	9/8/14	PRE-FINAL (90%) DESIGN		-	-	-	-
0	4/5/13	INTERMEDIATE (60%) DESIGN					

REVISIONS

APPROVED BY		
-	SO	XXXXX
	SUPV	PD
	DSGN	GO
	DWN	GO
	CHKD	JM
	OK	PD
	DATE	9/8/14
	SCALES	1" = 20'-0"

TOPOCK GROUNDWATER REMEDIATION PROJECT

PIPE LAYOUT
SHEET 1 OF 4

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
C-10-11	REV 2

Attachment J: RTC #313

Revised Exhibit 5.3-1 of the 90% O&M Manual Volume 2, Sampling and Monitoring Plan

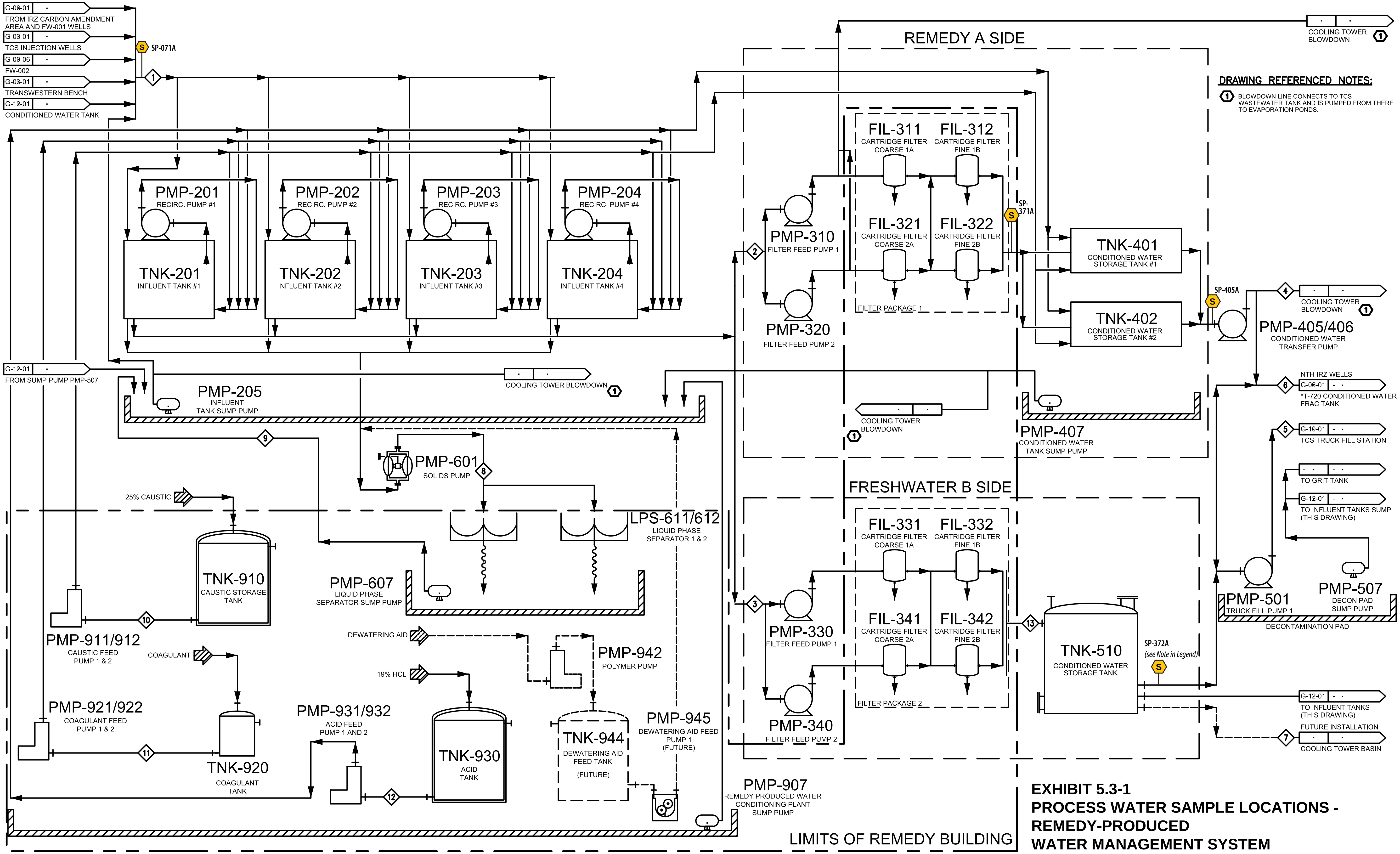


EXHIBIT 5.3-1
PROCESS WATER SAMPLE LOCATIONS - REMEDY-PRODUCED WATER MANAGEMENT SYSTEM

GROUNDWATER REMEDY DRAFT OPERATION AND MAINTENANCE MANUAL
VOLUME 2: SAMPLING AND MONITORING PLAN
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

LEGEND S Sampling Port

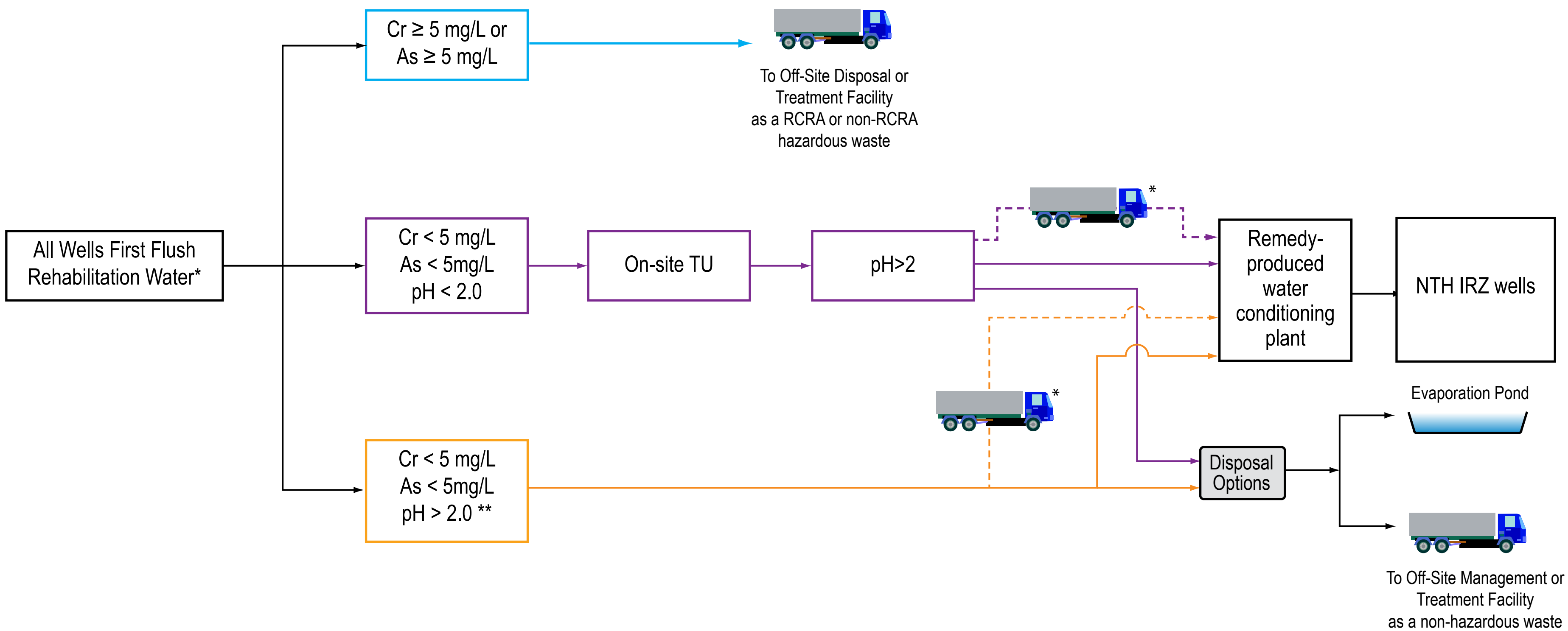
Note for SP-372A:
A single sampling port will be installed on the common effluent pipe of TNK-510.

UPDATED JULY 2015

CH2MHILL.

Attachment K: RTC #354

Revised Figure 3.4-3 of the 90% BOD, Section 3



LEGEND

Piping

Conveyed by truck

TU	Treatment Unit permitted for (pH adjustment) hazardous waste treatment per California Code of Regulations Title 22. TU may be equipped with filters to remove solids.
Cr	Chromium (dissolved)
As	Arsenic (dissolved)
IRZ	In-situ Reactive Zone
*	Conveyance by trucking is backup option for IRZ and injection wells. For extraction wells, some trucking may be required.
**	An optional approach to pH adjustment at the Remedy-Produced Water Conditioning Plant is to adjust it in the field with an On-Site TU
RCRA	Resource Conservation and Recovery Act

FIGURE 3.4-3
REMEDY-PRODUCED WATER SCHEMATIC – FIRST FLUSH REHABILITATION
GROUNDWATER REMEDY BASIS OF DESIGN REPORT
PRE-FINAL (90%) DESIGN
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

Attachment L: RTC #418

Technical Memorandum Regarding the Development of the Simulated Threshold TOC Concentrations for Reduction of Cr(VI)

ARCADIS U.S., Inc.
10 Friends Lane, Suite 200
Newtown
Pennsylvania 18940
Tel 267-685-1800
Fax 267-685-1801

MEMO

To:
DTSC
DOI

Copies:
Yvonne Meeks, PG&E
Richard Orens, ARCADIS
Kristin Mancini, ARCADIS
Christina Hong, CH2M HILL

From:
Margaret Gentile
Jonathan Roller

Date:
June 16, 2015

ARCADIS Project No.:
RC000753.0026

Subject:
Response to 90% BOD Comment #418 with Supporting Data from Hinkley

---

Introduction

This technical memorandum serves as a document to provide supporting information in response to Comment #418 (DOI-11) regarding the development of the simulated threshold total organic carbon (TOC) concentration for reduction of hexavalent chromium (Cr(VI)).

Comment #418 (DOI-11)

Referenced Text: (90% BOD Appendix B Section 3.4.1) "The solute transport model (described below; see Section 6) assumes Cr(VI) reduction in the presence of organic carbon above 0.1 mg/L."

Comment: "In light of the discussion pertaining to the apparent TOC concentrations required for reduction of Cr(VI) (100 mg/L) it is difficult to see why this assumption is made particularly since the reporting limits for the TOC are 1 mg/L. Please provide justification for the 0.1 mg/L TOC assumption."

PG&E Response: The concentration of TOC needed to establish chromium-reducing conditions given a continuous injection system will be different than that needed to establish chromium-reducing conditions during the discrete injection pilot test. The 0.1 mg/L TOC threshold was established as the minimum carbon concentration to support microbial growth and Cr(VI) reduction through a series of sensitivity analyses for other Cr(VI) impacted sites where Cr(VI) reduction using a large-scale recirculation system had been observed (i.e., PG&E Hinkley Compressor Station site). During continuous injections at Hinkley, the 0.1 mg/L threshold was well-correlated to the zone of Cr(VI) reduction. This analysis was done by fitting the chromium reduction data and available TOC data above the reporting limit, which allowed for the determination of the threshold below the reporting limit. The lower 0.1 mg/L also allows the model to account for potential lysis effects where carbon from previous microbial communities is essentially recycled to support further microbial growth.

A sensitivity analysis was also performed on the trigger TOC level for Cr(VI) reduction to evaluate potential effects. As discussed in Section 10.15 of Appendix B, the TOC threshold concentration was increased an order of magnitude to 1 mg/L. At this higher TOC threshold, sufficient Cr(VI) reduction was achieved. The model predicted potential Cr(VI) breakthrough along the NTH IRZ line at the 10-year mark during the IRZ OFF cycle. However, much of this Cr(VI) is treated during the subsequent IRZ ON cycle, and the model results are comparable for the 0.1 and 1 mg/L TOC triggers at 30 years. Potential operational adjustments to address a higher TOC threshold concentration are described in Table 6.6-1 of Appendix B and include the following (primarily applicable to the NTH IRZ): adjust TOC dosing concentration, frequency, and/or duration; and activation of provisional wells to bolster lateral coverage.

DOI Response: "Hinkley data which was not provided"

Addendum: Supporting Analysis from Hinkley Site

In order to further support the response to #418, below is a summary of the modeling used for the Hinkley site and the TOC threshold used in the solute transport modeling for that site. Large scale IRZ operations, similar in design to the continuous recirculation systems planned for the Topock site, began at Hinkley in late 2007. A solute transport model was first developed for the Hinkley site in 2008 in support of the feasibility study for the site. In 2014, the solute transport model parameters were further examined in comparison with data collected through 2014 as part of an assessment of remedial timeframes (ARCADIS 2014). The results of these modeling evaluations indicate that the TOC threshold is between 0.1 and 1 mg/L, consistent with the range of values considered in the Topock solute transport modeling (ARCADIS 2014).

The attached figure shows the results of model runs conducted with actual Hinkley site IRZ operations (i.e. actual injection and extraction locations, flowrates over time, and TOC injection concentrations) using 0.1 and 1 mg/L TOC threshold concentrations in comparison to actual groundwater data over the period of large scale IRZ operations from Fourth Quarter 2007 to First Quarter 2014. A comparison of the results for the IRZ areas south of Highway 58 shows that the 0.1 mg/L TOC threshold concentration replicates the downgradient flush of the clean water from IRZ injection points well (Location 3 on **Figure 1**), while the 1 mg/L TOC threshold results in a better agreement with the lateral distribution than the 0.1 mg/L TOC threshold run (see Locations 1 and 2 on **Figure 1**).

Given that the higher TOC threshold value improved prediction of some aspects of actual performance, while underpredicting other aspects of actual performance, remedial timeframe assessment modeling for the Hinkley site was conducted with both TOC thresholds to provide a range of remedial timeframe estimates. These TOC threshold values are consistent with those utilized in the 90% BOD Appendix B and associated sensitivity analyses. The performance of the proposed Topock remedy will be evaluated against the model in future model updates to further support solute transport parameters.

Figures

1 Comparison of Observed and Simulated Hexavalent Chromium Concentrations

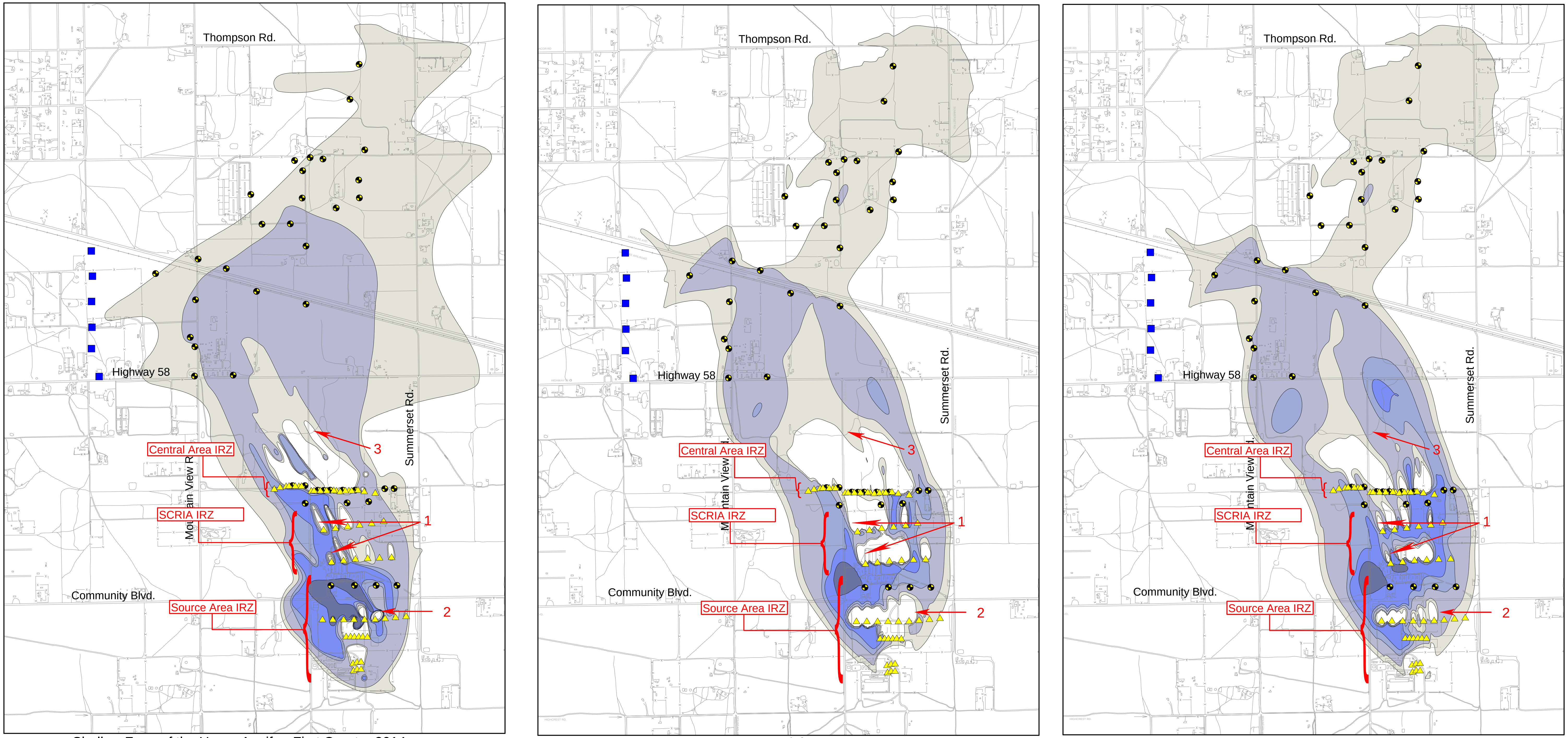
References

ARCADIS. 2014. *Remedial Timeframe Assessment*. PG&E Hinkley Compressor Station. Hinkley, California. June 30.

CONTOURED FROM MONITORING DATA

SIMULATED 0.1 mg/L TOTAL ORGANIC CARBON THRESHOLD

SIMULATED 1.0 mg/L TOTAL ORGANIC CARBON THRESHOLD



Shallow Zone of the Upper Aquifer, First Quarter 2014

Model Layer 1

Model Layer 1

LEGEND

Chromium Concentration (ug/L)

0 | 3.1 | 10 | 50 | 100 | 500

PG&E Remediation Extraction Well

PG&E Remediation Injection Well

Northwest Freshwater Injection Well

Scale in feet

0 | 2,000 | 4,000

Notes:
ug/L- Micrograms per liter
PG&E - Pacific Gas and Electric
Contoured data reference, Figure 4-6 (CH2MHill and ARCADIS 2014), included in Appendix A for reference.
Simulated contour initalized with Fourth Quarter 2007 data and run with actual operating conditions for 7 years

PACIFIC GAS AND ELECTRIC
HINKLEY, CALIFORNIA

COMPARISON OF OBSERVED AND SIMULATED HEXAVALENT CHROMIUM CONCENTRATIONS

ARCADIS

FIGURE
1

Attachment M: RTC #634

Revised REMEDY-SOP-08: Inspection of Frac Tanks

Standard Operating Procedure
PG&E Topock Groundwater Remedy Operation and Maintenance Plan

Title: Inspection of Frac Tanks

Number: Remedy-SOP-08_Rev1~~0~~

~~Creation~~ Revision Date: 5/19/2015~~8/26/2013~~

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedure for inspection and maintenance of frac tanks at the MW-20 Bench and Remedy-produced Water Conditioning Plant.

The operator should not break the plane of the tank openings with body parts at any time during this procedure, as it would be considered confined space entry. If confined space entry is necessary for a special procedure, the Health and Safety Plan should be referenced.

2 Drawing Numbers

- IRZ Carbon Amendment Building: I-06-02
- Remedy-Produced Water Conditioining Plant Influent Tank Farm: I-11-01 through I-11-04
- Remedy-Produced Water A-Side Conditioned Water Storage Tanks: I-14-01

3 Equipment/Supplies

- Appropriate personal protective equipment (PPE), including fall protection
- Health and Safety Plan
- Lockout/tagout tags and lockout/tagout manual for frac tank maintenance (if tank shutdown is performed)
- Portable/submersible pump or vac truck (if tank draining is performed)

4 Procedure

~~1.~~ Inspect tanks and associated equipment with reference to the following instructions (steps 2 through 12). ~~.~~

~~2.~~ 1. If unsuitable tank conditions are observed at any time throughout the procedure:

1.1. Reference the Hazardous Materials Business Plan (HMBP) if the tank contains hazardous materials (acid or caustic) to determine how the materials should be handled if the chemicals are discharged from the tank.

1.2. Shut down and/or drain the tank if it is warranted (e.g. the tank is in danger of a blow out or failure). Steps a through f below are procedures to shutdown and drain an individual frac tank (If more than one frac tank is to be shutdown and/or drained at the same time, special procedures are required):

a. Influent Tank Farm (TNK-201 through TNK-204), Shutdown Frac Tank

i. Lockout/tagout the frac tank by following instructions in the lockout/tagout manual.
ii. Use the HMI to turn OFF the tank's recirculation pump (PMP-201 for Influent Tank 1, PMP-202 for Influent Tank 2, PMP-203 for Influent Tank 3, PMP-204 for Influent Tank 4).
iii. Close the following manual valves upstream, downstream, and on the chemical recirculation line of the frac tank:
   1. Influent Tank 1: V-201A, V-201F, V-201G, V-201I, V-201K
   2. Influent Tank 2: V-202A, V-202F, V-202G, V-202I, V-202K
   3. Influent Tank 3: V-203A, V-203F, V-203G, V-203I, V-203K
   4. Influent Tank 4: V-204A, V-204F, V-204G, V-204I, V-204K

b. Influent Tank Farm (TNK-201 through TNK-204), Drain Frac Tank

i. Use the HMI to verify that there is sufficient volume in the other influent tanks for the discharge from the influent tank being drained.
   - Proceed to next steps only if there is sufficient volume in the other influent tanks.
ii. Inspect the secondary containment per Remedy-SOP-07 (Secondary Containment Inspection and Maintenance at Buildings).
iii. Proceed to next steps only if the secondary containment is in acceptable condition.Plug in the Influent Tank Farm sump pump (PMP-205).
iv. If the frac tank is not already shutdown, shutdown the frac tank by completing all steps listed for shutting down an Influent Tank Farm Frac Tank (see step a. above).
v. Slowly open the manual drain valve on the frac tank (V-201M for Influent Tank 1, V-202M for Influent Tank 2, V-203M for Influent Tank 3, V-204M for Influent Tank 4):
vi. Ensure that the tank discharge properly drains in the secondary containment to the sump pump.
   - If there is any malfunctioning of the secondary containment and/or sump pump, immediately close the manual drain valve that was opened in Step v.
vii. If the frac tank does not drain completely by gravity, pump out the remaining water using a portable pump or vac truck.
   a. Drain the discharge into the influent tank farm sump (with the portable pump) OR haul to the influent tanks or liquid phase separator (with the vac truck).
viii. After the frac tank has completely drained, close the manual drain valve that was opened in step v.
ix. After all discharge has been pumped from the sump, unplug the Influent Tank Farm Sump Pump (PMP-205).
x. If frac tank is to be cleaned after draining, see RTP-SOP-07 (Manual Cleaning of Frac Tanks).

c. Conditioned Water Tank Farm (TNK-401 and TNK-402), Shutdown Frac Tank

i. Lockout/tagout the frac tank by following instructions in the lockout/tagout manual.
ii. Close the manual valves upstream/downstream of the frac tank:
   1. Conditioned Water Storage Tank 1: V-401A, V-401B
   2. Conditioned Water Storage Tank 2: V-402A, V-402B

d. Conditioned Water Tank Farm (TNK-401 and TNK-402), Drain Frac Tank

i. Use the HMI to verify that there is sufficient volume in the other influent tanks for the discharge from the influent tank being drained.

ii. Proceed to next steps only if there is sufficient volume in the other influent tanks.

iii. Inspect the secondary containment per Remedy-SOP-07 (Secondary Containment Inspection and Maintenance at Buildings).

iv. Proceed to next steps only if the secondary containment is in acceptable condition.Plug in the Conditioned Water Tank Farm sump pump (PMP-407).

v. If the frac tank is not already shutdown, shutdown the frac tank by completing all steps listed for shutting down the Conditioned Water Tank Farm Frac Tanks (see step c. above).

vi. Slowly open the manual drain valve on the frac tank (V-401C for Conditioned Water Storage Tank 1, V-402C for Conditioned Water Storage Tank 2):

vii. Ensure that the tank drainage properly drains in the secondary containment to the sump pump.

- If there is any malfunctioning of the secondary containment and/or sump pump, immediately close the manual drain valve that was opened in step v.

ii. If the frac tank does not drain completely by gravity, pump out the remaining water using a portable pump or vac truck.

- Drain the discharge into the conditioned water tank farm sump (with the portable pump) OR haul to the influent tanks or liquid phase separator (with the vac truck).

viii. After the frac tank has completely drained, close the manual drain valve that was opened in step ~~i~~v.

ix. After all discharge has been pumped from the sump, unplug the Conditioned Water Tank Farm sump pump (PMP-407).

x. If frac tank is to be cleaned after draining, see RTP-SOP-07 (Manual Cleaning of Frac Tanks).

e. MW-20 Bench (T-IRZ00-720, T-IRZ00-721, T-IRZ00-723), Shutdown Frac Tank

i. Lockout/tagout the frac tank by following instructions in the lockout/tagout manual.

ii. Close the manual valves upstream of the frac tank as applicable:

- Backwash Frac Tank (T-IRZ00-721): V-IRZ00-728C, V-IRZ00-728I, V-IRZ00-728K, V-IRZ00-728S
- Clean-in-Place Frac Tank (T-IRZ00-723): V-IRZ00-728A, V-IRZ00-728E, V-IRZ00-728G

f. MW-20 Bench (T-IRZ00-721, T-IRZ00-723), Drain Frac Tank

i. Use the HMI to verify that there is sufficient volume in the Remedy-produced Water Conditioning Plant Influent Tank Farm (TNK-RTP-201 through TNK-RTP-204) for the discharge from the frac tank being drained.

ii. Proceed to next steps only if there is sufficient volume in the Influent Tank Farm.

iii. Close/open valves on discharge line to direct flow to Remedy-produced Water Conditioning Plant.

- V-IRZ00-726B (open, manual), V-IRZ00-726D (open, manual), V-IRZ00-727D (open, manual), V-IRZ00-727E (open, manual)
- Backwash Frac Tank (T-IRZ00-721): V-IRZ00-726O (closed, manual)
- Clean-in-Place Frac Tank (T-IRZ00-723): V-IRZ00-726O (open, manual), V-IRZ00-726F (closed, manual), V-IRZ00-726B (closed, manual), FV-IRZ00-732 (closed, via HMI)

iv. Follow Step 4 of IRZ-SOP-13 to transfer water to the Remedy-produced Water Conditioning Plant.
v. Close the manual valves downstream of the frac tank:
- Backwash Frac Tank (T-IRZ00-721): V-IRZ00-726B
- Clean-in-Place Frac Tank (T-IRZ00-723): V-IRZ00-726C

iii. If the frac tank is not sufficiently drained, pump out the excess water using a vac truck or submersible pump placed in frac tank.
vi. If frac tank is to be cleaned after draining, see RTP-SOP-07 (Manual Cleaning of Frac Tanks).

g. MW-20 Bench (T-IRZ00-720), Drain Conditioned Water Frac Tank

i. Use the HMI to verify that the National Trails Highway (NTH) In-Situ Reactive Zone (IRZ) injection well system is active.
ii. Proceed to next steps only if NTH IRZ injection wells are able to receive water.
iii. Open manual valves on discharge line to direct flow to the NTH IRZ: V-IRZ00-726A, V-IRZ00-727B, V-IRZ00-727H, V-IRZ00-710H
iv. Place FV-IRZ00-728S into the “OPEN” position via the HMI
v. Place PMP-IRZ00-748 (Conditioned Water Injection Pump) into “AUTO”
vi. Visually inspect the lines for signs of leaks
vii. Once T-IRZ00-720 is empty, LT-IRZ00-756 will initiate the programmable logic controller to do the following:
- FV-IRZ00-728S will close
- PMP-IRZ00-748 will automatically shut off

viii. Use HMI to place PMP-IRZ00-748 into “OFF”
ix. Close manual valve V-IRZ00-726A downstream of the frac tank
iv. If the frac tank is not sufficiently drained, pump out the excess water using a vac truck or submersible pump placed in frac tank.
x. If frac tank is to be cleaned after draining, see RTP-SOP-07 (Manual Cleaning of Frac Tanks).

~~1.2. .~~

1.3. Attempt to fix the tank conditions with reference to the manufacturer’s instructions, if feasible.

1.4. If the tank conditions cannot be fixed, the operator should contact the Maintenance Supervisor so parts can be procured and work can be scheduled.

~~3.~~2. Inspect the outside of the process tank (including tank walls, anchors, supports, stairs and platforms) for the following:

- No signs of distortion, buckling, denting, or bulging on tank
- No signs of cracks, leakage, or corrosion on tank
- No severe corrosion or damage on staircase

~~4.~~3. Inspect the nozzles, piping and actuated and manual valves for the following:

- No signs of leakage or damage along piping
- No evidence of vibration along piping
- Piping is adequately supported
- No signs of leakage or damage at valves
- Nozzles are adequately sealed and there are no signs of leakage or damage
- Flanged connection bolts are tight and fully engaged with no sign of wear or corrosion

~~5.~~4. Carefully climb the staircase to the top of the tank to inspect the lid of the tank.

~~6.~~5. Fall protection must also be used when inspecting the lid of the tanks. Set up and connect to fall protection and ascend onto the roof of the tank.

~~7.~~6. Do not break the plane of the tank lid with body parts at any time during this procedure, as it would be considered confined space entry. If confined space entry is necessary for a special procedure, the Health and Safety Plan should be referenced

~~8.~~7. Inspect the roof for the following:

- No signs of distortion, buckling, denting, or bulging on roof
- No signs of cracks, leakage, or corrosion on roof

~~9.~~8. Descend from the roof of the tank

~~10.~~9. When it is safe to do so, disconnect from fall protection.

~~11.~~10. Carefully descend the staircase.

~~12.~~11. If applicable, move to next tank for inspection and repeat steps 1 through 10.

~~13.~~12. Contact the Maintenance Supervisor if there are any notes that require further maintenance so parts can be procured and work can be scheduled.

Attachment N: RTC #657

OSHA Suggested Spotting Signals for Vehicles

Preventing Backovers

Backing Safety Solutions

Spotter

Spotters are a proven method of protecting employees on foot behind vehicles with an obstructed view, but spotters themselves can be at risk for injury or even death. Employers can implement the following actions to help keep spotters safe:

- Ensure that spotters and drivers agree on hand signals before backing up.
- Instruct spotters to always maintain visual contact with the driver while the vehicle is backing.
- Instruct drivers to stop backing immediately if they lose sight of the spotter.
- Not give spotters additional duties while they are acting as spotters.
- Instruct spotters not to use personal mobile phones, personal headphones, or other items which could pose a distraction during spotting activities.
- Provide spotters with high-visibility clothing, especially during night operations.

Vehicles Causing the Most Backover Fatalities 2005-2010+

Dump Truck	**67**
Semi/Tractor Trailer	**40**
Truck	**30**
Forklift	**21**
Garbage Truck	**20**
Pick-up Truck	**16**

+OSHA Integrated Management Information System data

Suggested Spotting Signals

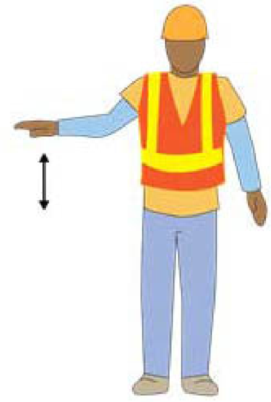
Back up

Back, turn left

Back, turn right

Move forward

Distance left to back



Slow down

Stop

Note: The following list of solutions is not required by any OSHA standard. It is provided for informational purposes only.

Cameras

Most vehicles (and some types of mobile equipment) can accommodate a camera that provides operators with a view to the rear. Some vehicles come equipped with cameras or may be offered with them as optional equipment. Camera systems can also be purchased as after-market equipment for vehicles. Viewing screens may be dash-mounted but must not block the driver's view out the windshield. Harsh environments, such as some construction sites or mines, may require more rugged cameras. Determining where to mount a camera for maximum effectiveness may be difficult, especially on large vehicles. For example, dump trucks may require two or three cameras to monitor the blind spots on the front, rear, and side of the vehicle.

Proximity Detection Systems

Radar and ultrasonic technology both are used in backing safety systems. A radar system transmits a signal, which is bounced off an object. The signal is then received by a receiver. These systems alert the driver with a visual and/or audio warning. These systems must be positioned so that they won't detect harmless objects, such as the concrete slab of a driveway, which can interfere with the detection of an object or person behind the vehicle or mobile equipment. Also, the composition of an object can affect detection, with some materials being virtually invisible to radar. Like cameras, this equipment can be mounted on most vehicles and may be an option from some manufacturers.

Ultrasonic systems, such as sonar, emit bursts of ultrasonic waves in a frequency above the hearing threshold of humans. When the waves strike an object, they generate echoes used to determine the distance to the object. These systems alert the driver with a visual and/or audio warning.

Tag-based Systems

Another type of proximity detection system is an electromagnetic field-based system, which is a type of tag-based system. This system consists of electromagnetic field generators and field detecting devices. One electromagnetic field-based system uses electromagnetic field generators installed on a vehicle and electronic sensing devices (a tag) worn by persons working near the vehicle. Another electromagnetic field-based system uses field generators worn by persons working near the vehicle, with the sensing devices installed on the vehicle. These electromagnetic field-based systems can be programmed to warn affected workers, stop the vehicle, or both, when workers get within the predefined danger zone of the vehicle.

Internal Traffic Control Plans

An internal traffic control plan (ITCP) is another method used to address backover hazards. These are plans that project managers can use to coordinate the flow of moving equipment, workers, and vehicles at a worksite to minimize or eliminate vehicles and employees from crossing paths. These plans can significantly reduce, or possibly eliminate, the need for vehicles to back up on a site.

Attachment O: RTC #662

Revised RTP-SOP-09: Inspection of B-side Conditioned Water Storage Tank

Standard Operating Procedure

PG&E Topock Remedy-produced Water Conditioning Plant Operation and Maintenance Plan

Title: Inspection of B-Side Conditioned Water Storage Tank

Number: RTP-SOP-09_Rev1~~0~~

~~Creation~~ Revision Date: ~~8/26/2013~~5/19/2015

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS).

The objective of this Standard Operating Procedure (SOP) is to describe the procedure for inspection of the Freshwater B-Side Conditioned Water Storage Tank.

The operator should not break the plane of the tank openings with body parts at any time during this procedure, as it would be considered confined space entry. If confined space entry is necessary for a special procedure, the Health and Safety Plan should be referenced.

2 Drawing Numbers

- Freshwater B-Side Conditioned Water Storage Tank (TNK-510): I-14-02
- Conditioned Water Storage Tank Mechanical Plans and Details: S-14-01 through S-14-05

3 Equipment/Supplies

- Appropriate personal protective equipment (PPE), including fall protection
- Health and Safety Plan
- Lockout/tagout tags and lockout/tagout manual for B-Side Conditioned Water Storage Tank maintenance (if tank shutdown is performed)
- Portable pump and water hauling truck OR vac truck (if tank draining is conducted)

4 Procedure

~~14.~~ Inspect tank and associated equipment with reference to the following instructions (steps 2 through 11).

1. If unsuitable tank conditions are observed at any time throughout the procedure:

    1.1 Shut down and/or drain the tank if it is warranted (e.g. the tank is in danger of a blow out or failure).

    1.1.1 Shutdown Tank

    i. Lockout/tagout the tank by following instructions in the lockout/tagout manual for B-Side Conditioned Water Storage Tank maintenance.

ii. Use the HMI to turn OFF the B-Side Filter Feed Pumps (PMP-330 and PMP-340).

iii. Close the manual valve upstream (V-510A) and downstream (V-510B) of the Conditioned Water Storage Tank.

~~1.1.1~~1.1.2 Drain Tank

i. Use the HMI to verify that there is sufficient volume in the influent tanks for the discharge from the B-Side Conditioned Water Storage Tank.

a. Proceed to next steps only if there is sufficient volume in the influent tanks.

ii. If the tank is not already shutdown, shutdown the tank by completing all steps listed for shutting down the tank (see step a. above).

iii. Slowly open the manual drain valve on the tank (V-510G).

iv. Ensure that the tank discharge properly drains into the influent tanks.

a. If there is any malfunctioning of the tank discharge draining to the influent tanks, immediately close the manual drain valve that was opened in step iii.

v. If the tank does not drain completely by gravity, pump out the remaining water using a portable pump and water hauling truck OR ~~,~~vac truck.

a. Close V-510G.

b. Connect the portable pump or vac truck to the connection downstream of V-501D.

c. If using a portable pump, ensure the water flows to the water hauling truck.

d. Initiate pumping using the portable pump or vac truck.

e. After TNK-510 is completely drained, terminate pumping from the portable pump or vac truck.

f. Close V-501D.

g. Disconnect the portable pump or vac truck.

h. The discharge in the water hauling truck or vac truck may be drained in the influent tanks or liquid phase separator.

vi. After the tank has completely drained, verify V-510G is closed.

1.2 Attempt to fix the tank conditions, if feasible.

1.3 If the tank conditions cannot be fixed, the operator should contact the Maintenance Supervisor so parts can be procured and work can be scheduled.

2. Inspect the outside of the tank (including tank walls, anchors, supports, stairs and platforms) for the following:

- No signs of distortion, buckling, denting, or bulging on tank
- No signs of cracks, leakage, or corrosion on tank
- No severe corrosion or damage on staircase
- Grating at flush cleanout catch basin is intact
- Flush cleanout catch basin is free of standing water

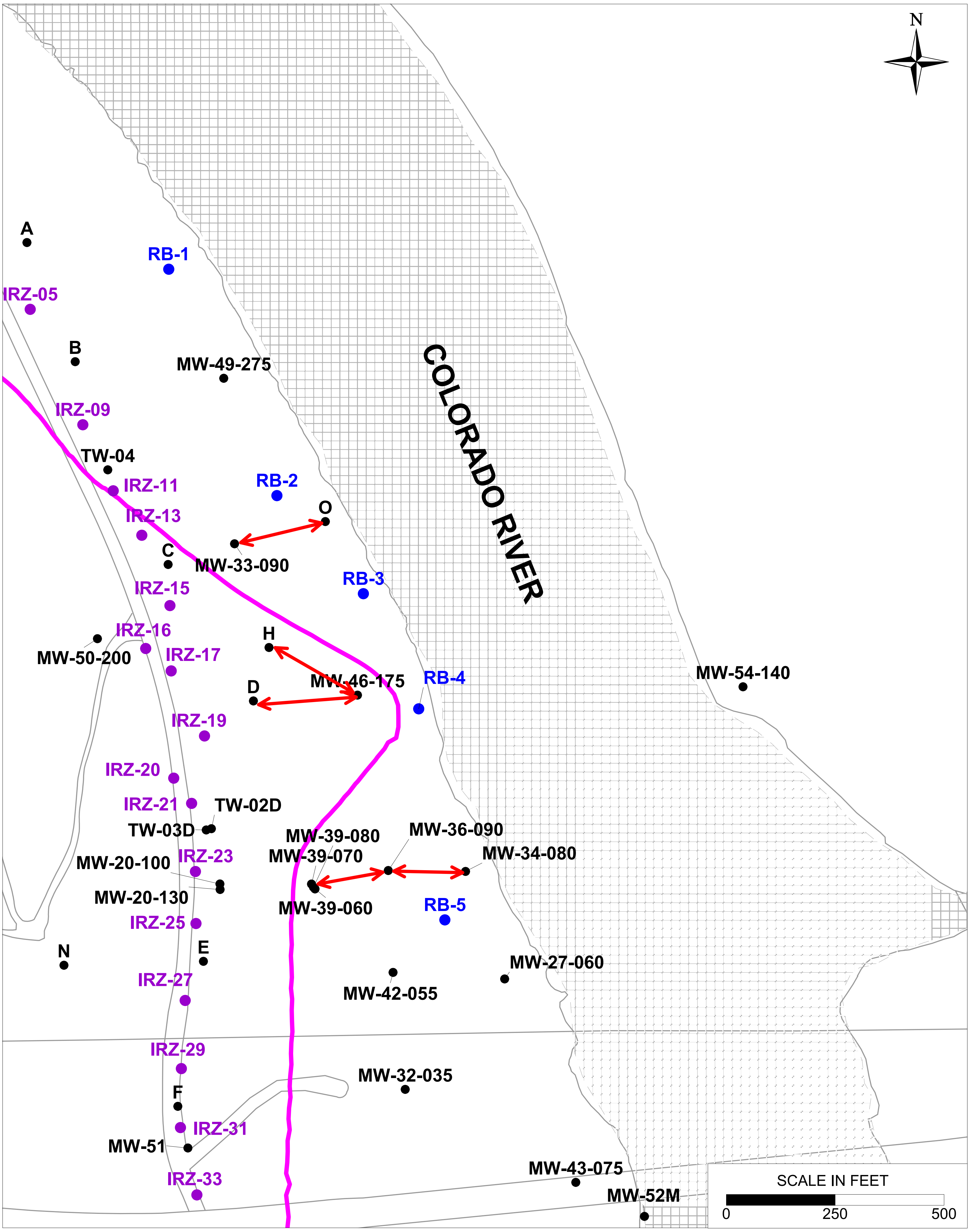
3. Inspect the nozzles, piping and actuated and manual valves for the following:

- No signs of leakage or damage along piping
- No evidence of vibration along piping
- Piping is adequately supported
- No signs of leakage or damage at valves
- Nozzles are adequately sealed and there are no signs of leakage or damage
- Flanged connection bolts are tight and fully engaged with no sign of wear or corrosion
- Bird screen on overflow line is intact

4. Carefully climb the staircase to the top of the tank to inspect the lid of the tank.
5. Fall protection must also be used when inspecting the lid of the tanks. Set up and connect to fall protection and ascend onto the roof of the tank.
6. Do not break the plane of the tank lid with body parts at any time during this procedure, as it would be considered confined space entry. If confined space entry is necessary for a special procedure, the Health and Safety Plan should be referenced
7. Inspect the roof for the following:
   - No signs of distortion, buckling, denting, or bulging on roof
   - No signs of cracks, leakage, or corrosion on roof
8. Descend from the roof of the tank
9. When it is safe to do so, disconnect from fall protection.
10. Carefully descend the staircase.
11. Contact the Maintenance Supervisor if there are any notes that require further maintenance so parts can be procured and work can be scheduled.

Attachment P: RTC #711

Figures 711-1 and 711-2: Proposed Well Pairs in Model Layers 3 and 4



LEGEND

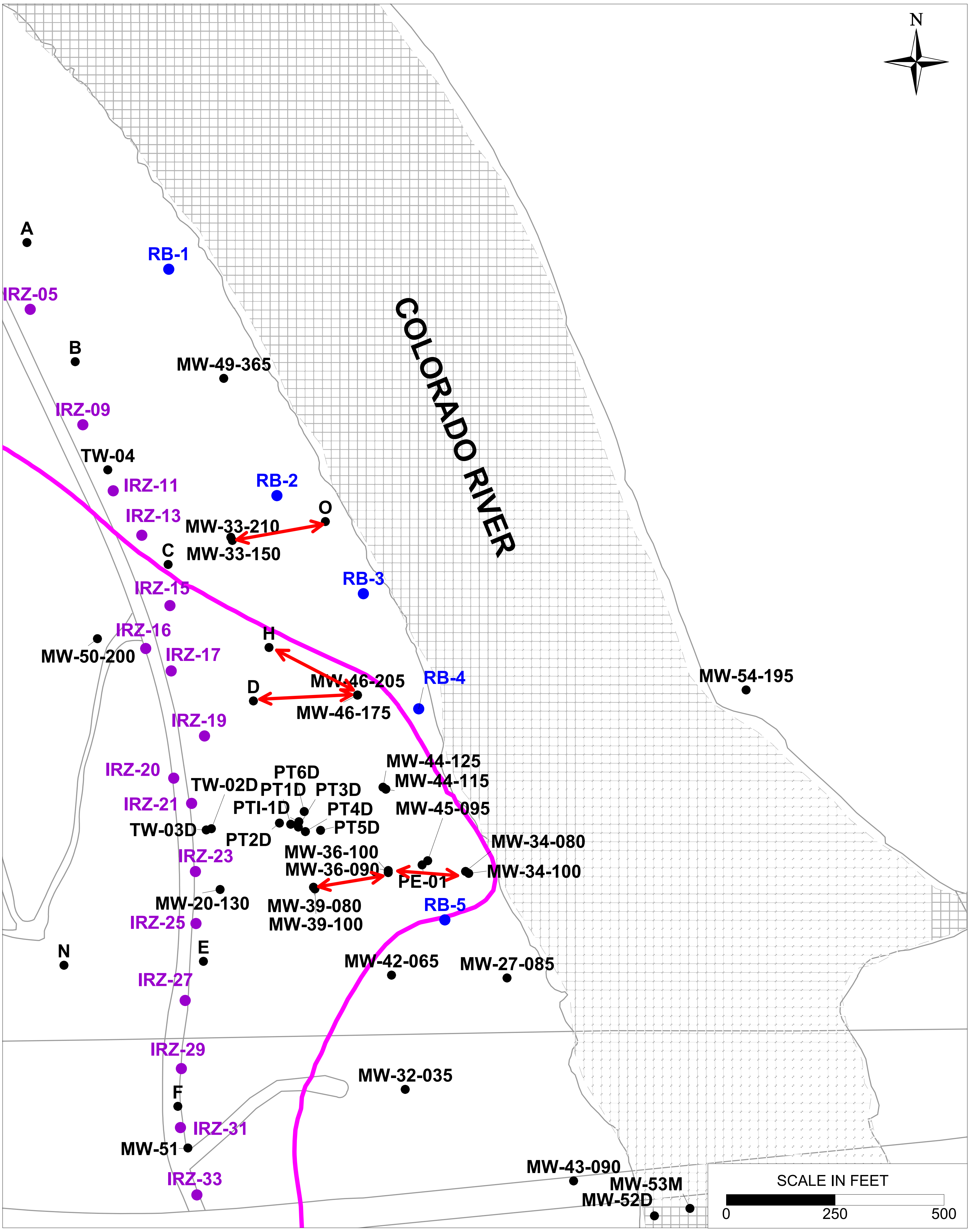
- IRZ WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- PROPOSED WELL PAIR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
APPENDIX L

PROPOSED WELL PAIRS
SCREENED IN MODEL LAYER 3

ARCADIS

FIGURE
711-1



LEGEND

IRZ WELLS

EXTRACTION WELLS

MONITORING WELLS

ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR

PROPOSED WELL PAIR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
APPENDIX L

PROPOSED WELL PAIRS
SCREENED IN MODEL LAYER 4

ARCADIS

FIGURE
711-2

Attachment Q: RTC #803

Revised Management Protocol for Handling and Disposition of Displaced Site Material and Park Moabi Design

Management Protocol for Handling and Disposition of Displaced Site Material, Topock Remediation Project, Needles, California

PREPARED FOR: Topock Remediation Project Files

PREPARED BY: Pacific Gas and Electric Company

DATE: October 3, 2012, rev. July 2015

This document presents the general approach and management protocol required for the handling and disposition of soil and/or rock (referred to as "material" throughout the document) that is displaced as a result of past (as practical), present, and future activities associated with the Pacific Gas and Electric Company (PG&E) Topock Remediation Project, Needles, California. Specifically, this includes material removed from the Earth (i.e., displaced) as a result of drilling, excavation, sampling, testing, construction, grading, and other remedial activities. The management of material that may be disturbed as a result of remedial activities but not displaced from its natural location, such as soil disturbed by foot or vehicle traffic along a pathway, is not within the scope of this protocol. This protocol is applicable to the handling and disposition of displaced materials only. Further, materials that were not part of the natural site condition (e.g., building materials, equipment, waste, debris, or imported fill[1]) are not included in this protocol.

A draft of this protocol (dated October 3, 2012) was included in the Soil Management Plan associated with the Basis of Design Report/Pre-Final (90%) Design Submittal and Construction/Remediation Action Work Plan (September 8, 2014). Subsequent to agency review of the design submittal, this protocol has been revised per comment from the Department of the Interior (DOI) (Comment #803, DOI-333). The October 3, 2012 draft of this protocol included a provision for the long-term storage of material that is determined to be non-hazardous waste but unsuitable for a final disposition decision on-site because contaminants are present above the interim screening level. The 90% design submittal identified an area (located on federal land) for the long-term storage of material that is generated during construction of the final groundwater remedy and is characterized to meet this profile; however, the DOI comment indicates that based on discussions with San Bernardino County, the adjacent leasee of Moabi Regional Park, and internal discussions between the U.S. Bureau of Land Management (BLM) and the DOI, PG&E must find an alternate location for storage. Based on further clarifications from DOI and BLM, PG&E understood that storage of waste soil above screening levels would not be allowed anywhere on federal lands within the project area. The remaining potential storage locations are private properties owned by the Fort Mojave Indian Tribe (FMIT) and PG&E. Given the groundwater remedy facilities already planned to be located on the Topock Compressor Station (TCS) and the TCS's operational needs for the property for natural gas compressor operations, there is space on PG&E property only to temporarily store a small number of soil bins at a time while awaiting analysis prior to final disposition. There is no available space on PG&E property to store waste soil on a longer term basis. Nor have the FMIT identified any locations on the Tribe's property within the project area for this purpose. PG&E also contacted treatment storage and disposal facilities (TSDFs) and was told that the TSDFs would accept the waste soil for disposal, but not storage.

Given the above, PG&E determined that there was no available alternate location for the long-term storage of material with concentrations above the interim screening levels. Therefore, this protocol has been revised to exclude this provision.

---

[1] For the purpose of this protocol, imported fill is defined as unconsolidated mixtures of sand, silt, and gravel (engineered gradations, or otherwise) that were not originally derived from inside the defined project boundary. Specific examples of imported fill material may include road base material, shading material used in pipeline trenches, or crushed rock used for railroad ballast.

1.0 Introduction

PG&E carefully plans Topock Remediation Project activities to minimize both the disturbance and displacement of site material. The land and soils are to be handled and managed with care and respect. Therefore, the protocol established in this plan is intended to minimize the amount of displaced material that leaves the site and instead, provide for eventual return, reuse, or restoration of the material onto the lands from which it was displaced. Through the application of this protocol and its incorporation into future work plans involving material displacement, it is anticipated that the goal of careful and respectful handling of soil material will be fulfilled.

In addition to addressing Tribal requests, this protocol was developed to comply with Mitigation Measure CUL-1a-8 as set forth in the certified Environmental Impact Report (EIR) and Mitigation Monitoring and Reporting Plan (MMRP) adopted by the California Department of Toxic Substances Control (DTSC). This measure requires PG&E to develop a Cultural Impact Mitigation Program (CIMP) as part of the final design of the approved groundwater remedy, and specifically subparagraph (g) requires the CIMP to include protocols for handling soil cuttings[2]. DTSC adopted this measure following its determination that the project area is a significant historical resource for California Environmental Quality Act (CEQA) purposes (Final EIR, p. 4.4-57). Similarly, as part of the consultation process for the Programmatic Agreement (PA) under Section 106 of the National Historic Preservation Act (NHPA), ~~the U.S. Bureau of Land Management (~~BLM~~)~~ determined that a traditional cultural property (TCP) eligible for inclusion on the National Register of Historic Places exists within the Area of Potential Effect (APE). Throughout this document, the term "site" refers to the project area~~ within the APE~~.

[2] Mitigation Measure CUL-1a-8(g) states the following: Protocols for the repatriation of clean soil cuttings generated during construction activities and during drilling associated with repair/replacement activities during operations and maintenance phases. The soil cuttings shall be managed in compliance with applicable laws and regulations on site.

2.0 Statement from Fort Mojave Indian Tribe

The following statement was made by the Fort Mojave Indian Tribe regarding the site background and cultural significance:

> *The Topock site and adjacent lands are part of a larger geographical area referred to as a Traditional Cultural Landscape (TCL). The TCL is the ancestral home of the Fort Mojave Indian Tribe and other Native American Tribes including the Hualapai Nation, Colorado River Indian Tribes, Quechan Nation, Cocopah Tribe, and Yavapai-Prescott Nation. This entire TCL is of tribal religious significance. In some areas and at certain times, tribal members carry out various cultural activities and religious ceremonies.*
>
> *The very nature of the remedial activities being performed at the Topock Compressor Station involve disturbance to the TCL. Such activities as drilling, soil sampling, excavation, construction, monitoring, testing, vehicle movement, foot traffic, geophysical and other surveys, emplacement of markers, and discharge of water, solids, and other material disturb the sanctity of the land that is held in the hearts of Native Americans.*
>
> *In particular, the removal and disturbance of soils, both surficially and from the subsurface, is of concern to the Tribes because such actions are regarded as profound disruptions of the sacred landscape. While the nature and significance of this concern is not easily understood by non-Native Americans, perhaps the following excerpt, attributed to the Duwamish Chief Sealth, begins to aid in the understanding:*
>
>> *Every part of this country is sacred to my people. Every hillside, every valley, every plain and grove has been hallowed by some fond memory or some sad experience of my tribe. Even the rocks that seem to lie dumb as they swelter in the sun along the silent seashore in solemn grandeur thrill with memories of past events connected with the fate of my people, and the very dust under your feet responds more lovingly to our footsteps than to yours, because it is the ashes of our ancestors, and our bare feet are conscious of the sympathetic touch, for the soil is rich with the life of our kindred. (Chief Sealth, 1854)*
>
> *The Pacific Gas & Electric Company (PG&E), in its implementation of the remedial actions required by the United States Department of the Interior (DOI) and the California Department of Toxic Substances Control (DTSC) must commit to performing these actions in a manner that is respectful of Native American values.*

3.0 General Protocol for Management of Displaced Material (Mitigation Measure: CUL-1a-8[g])

This section presents each element of the protocol for the management of displaced material, including work planning, handling and short-term storage, contamination assessment, ~~long-term storage,~~ and final disposition. A graphical presentation of key elements of this process, and associated decision points, is presented on Figure 1 at the end of this document.

Commented [CM1]: Note – This figure has been revised (not in redline) to remove the long-term storage pathway. Other elements of the figure are unchanged.

3.1 Work Planning

PG&E is required to prepare a work plan whenever a field activity is performed at the Topock site in support of a regulatory requirement or action. Through the established federal regulatory review process, these work plans are made available for review by process stakeholders and by the governments of affected Native American Indian Tribes (referred to as “Tribes” throughout this document) via the consultation process set forth in the PA’s Consultation Protocol, consistent with Section 106 of the NHPA. In addition to the information describing the scope of work, field logistics and other implementation details, work plans that involve activities that displace site material also describe the process for the management and disposition of the materials. Work plans finalized subsequent to the development of this protocol will include specific description of the process for involving the input of Tribe(s) regarding the management of the material that will be displaced as a result of the work. Key procedural information to be included in the work plan will include, but not be limited to, the following:

- Summary of measures planned to minimize the amount of disturbance that will be incurred.
- Notification procedures to inform the Tribe(s), involved regulatory agencies, and affected land owner(s) regarding the proposed activities that will disturb/displace soil or other materials.
- The location of proposed disturbance activities (e.g. access pathways) and displacement activities (e.g. drilling or sampling locations), including maps.
- Estimation of the volume and type(s) of material that will be displaced.
- The location and methodology for short-term storage of displaced material (see Section 3.2).
- Methods that will be used to assess whether contaminants are present (see Section 3.3).
- Methods that will be used to minimize the volume of material that may be displaced during work including specific measures, such as field screening and material segregation strategies, to try and minimize the volume of material that requires disposal. ~~require long-term storage (see Section 3.4)~~.
- ~~The location and methodology for long-term storage (see Section 3.4).~~
- The anticipated location and methodology for final on- or off-site disposition (see Section 3.5).

3.2 Handling and Short-term Storage

Material that is displaced as a result of Topock Remediation Project activities including drilling, excavation, sample collection, testing, construction, grading, or other activities will be handled on-site in accordance with the project-specific work plan. Displaced material that must be characterized for key chemical properties prior to identifying the appropriate final disposition method will be stored for the short term. Short-term storage areas and the protocol for handing material in these areas may vary by project. Depending on the type and volume of material displaced, location, land owner considerations, and other pertinent factors, short-term storage methods may include storage devices (e.g. bins) or properly maintained stockpiles that prevent this material from commingling with other areas of the environment. In some cases, short-term storage for characterization may not be necessary. For example, displaced material that is pre-characterized or characterized rapidly as work is conducted will be managed directly for ~~long-term storage or~~ final disposition~~, as appropriate~~ (see Section~~s~~ ~~3.4 and~~ 3.~~5~~4~~, respectively~~).

Specific material handling and short-term storage details will be defined in the approved work plan for a given activity. Key details to be identified in the work plan include:

- The mode and location of short-term storage.
- The method of transfer from the point of origin to short-term staging area.
- Best management practices/regulatory requirements to prevent releases of the potentially contaminated material during transfer and storage.
- Best management practices to protect the material from weather, erosion, contamination, and vandalism while located in the short-term staging area(s).
- Method for segregation of soils based by location, as practicable and appropriate.

A key element of this handling protocol is the development of an inventory of all material displaced by Topock Remediation Project activities. Key information maintained in this inventory will include:

- Material displacement authorization – Specific work plan under which the work was conducted.
- Material origin – Specific location of the site.
- Material description (e.g., soil, rock, etc.).
- Date(s) of displacement or accumulation.

- Generating activity (e.g., drilling, excavation, etc.).
- Approximate volume of material stored.
- Short-term storage mode and location – Type of storage (including container identification number, as applicable) and location of short-term storage pending material characterization. In some cases, this information may need to be updated as containers are moved between areas of the site.
- Characterization status – Characterization sample information (e.g., date of submittal and laboratory used), date of receipt of results, and the contamination assessment based on comparison to screening criteria (see Section 3.3).
- ~~Long-term storage mode and location – Type of storage (including container identification number, as applicable) and location of long-term storage pending decision regarding final disposition (see Section 3.4). In some cases, this information may need to be updated as containers are moved between areas of the site.~~
- Final disposition information – Indication of the on-site or off-site final disposition action identified through discussion with Tribe(s), agencies, and the affected land owner(s), as appropriate, based on review of material type and the contamination assessment (see Section 3.~~5~~4).

Once the displaced material has been managed through final disposition, it will no longer be tracked in the displaced material inventory.

3.3 Contamination Assessment

Key chemical property information will be used to determine the final disposition method, and specifically, whether displaced material is suitable for retention on-site for eventual return, reuse, or replacement, or if the material must be removed from the site for disposal in accordance with applicable State and Federal laws and regulations. Key information that will be considered to assess whether the material is contaminated, and therefore, whether the material can remain on-site or not, includes:

- Existing information including knowledge of the history of an area, or laboratory analytical results collected during previous phases of work. Use of existing information may preclude the need for additional analytical testing. When available, this information will be included in the work plan.
- Results of characterization samples collected for laboratory analysis, and observation of the physical properties of the material (e.g., white powder, burned material, boulders, etc.), as defined in the approved work plan for a given activity.
- Screening values for various analytes identified for the purpose of determining the appropriate material disposition method. Tables 1 and 2 at the end of this document present a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations. Screening values included on Tables 1 and 2 are defined in the following bullets, which will be modified as screening levels are added to these tables:
  - **Interim Screening Levels (Table 1)** – This is predominantly the background value. However, if the background value is not available then the lesser of the DTSC residential California Human Health Screening Level (CHHSL) or the ecological comparison value is used. If a CHHSL is not available, it is the lesser of the United States Environmental Protection Agency (USEPA) residential regional screening level or the ecological comparison value. This value is the most conservative, and it is assumed that the project-specific cleanup goal and/or Tribal screening level will be equal to or greater than this value.

- **Hazardous Waste Toxicity Characteristic Levels (Table 2) –** These values are used to determine if the material should be classified as a State or Federal hazardous waste. Specifically, total constituent concentrations expressed in milligrams per kilogram (mg/kg) will be compared to the hazardous waste characteristic levels in Table 2, and will be evaluated as follows:

    1. If the total constituent concentration exceeds the total threshold limit concentration (TTLC), the soil represented by the sample will be classified as a non-RCRA California hazardous waste. Additional evaluation of the soluble threshold limit concentration (STLC), as described in step 3 below, will not be performed.
    2. If the total constituent concentration exceeds the numeric value of the RCRA toxicity characteristic (TC) level by about 20 times or more, the toxicity characteristic leaching procedure (TCLP) will be performed. If the constituent concentration in the TCLP leachate exceeds the TC level, the soil represented by the sample will be classified as a RCRA hazardous waste. Additional evaluation of the STLC, as described in step 3 below, will not be performed.
    3. If the sample has not been classified as hazardous waste in steps 1 or 2, the total constituent concentration will be compared to the STLC. If the total constituent concentration exceeds the numeric value of the STLC by about 10 times or more, the California Waste Extraction Test (WET) will be performed. If the constituent concentration in the WET exceeds the STLC, the soil represented by the sample will be classified as a non-RCRA California hazardous waste.
    4. If the sample has not been classified as a hazardous waste in steps 1, 2, or 3, or by other applicable hazardous waste standards, the soil represented by the sample will not be classified or managed as hazardous waste.

These values will be used to determine the final disposition of displaced material by comparing the representative concentration of a given volume of material to the screening values. The methodology for determining the representative concentration will be established in the project-specific work plan and should not be limited to a concentration-by-concentration comparison, but could include statistical estimates or averages based on multiple samples. Material that has a representative concentration that is equal to or below the interim screening level is suitable for return, reuse, or replacement on-site. Material that has a representative concentration that is greater than the interim screening level or is characterized as hazardous waste ~~must~~ will be disposed of off-site in accordance with applicable laws and regulations. ~~Material that has a representative concentration that is greater than the interim screening level, but not classified as a hazardous waste, will be stored on-site until the project-specific cleanup goals are established. Until these goals are established, material that falls into this intermediate category will be retained on-site for "long-term storage" (see Section 3.4).~~

The screening levels included in Tables 1 and 2 must be updated as applicable regulations and project-specific decisions are made. PG&E will review this information as remediation work plans are developed and implemented. As changes are determined appropriate, PG&E will submit revisions to the regulatory agencies and Tribe(s) for review and comment. Only agency approved values will be utilized.

Commented [CM2]: Note – Some of the screening levels on Table 1 have been updated (not in redline) as appropriate based on changes to the regulations since October 2012.

~~3.4 Long-Term Storage~~

~~Following contamination assessment, some material may be determined to be non-hazardous waste but unsuitable for final disposition on-site because contaminants are present above the interim screening level. Per DOI comment on this protocol (received in February 2012), this material cannot be returned to the land until project-specific cleanup goals are finalized in the Record of Decision (ROD) and may be stored until that time. Once these goals are established the contamination will be re-assessed based on existing data, or additional data as determined necessary, using the cleanup goals in place of the interim screening level to determine final disposition (see Section 3.5).~~

~~The long-term storage area(s) and the protocol for handling material in these areas may vary by project. Depending on the type and volume of material that must be stored, location, land owner considerations, and~~

~~other pertinent information, long-term storage methods may include storage devices (e.g. bins) or contained stockpiles that prevent this material from migrating away from the designated storage area(s). Coordination with agencies, Tribe(s), and affected land owners regarding the acceptable mode and location of long-term storage is critical in design of the work plan. Further, specific measures should be incorporated into the implementation of the given work plan, such as field screening and material segregation strategies, to try and minimize the volume of material that may require long-term storage.~~

3.~~5~~4 Final Disposition

Final disposition refers to the final action taken on behalf of the Topock Remediation Project as it relates to the management of material displaced during associated activities. This protocol has been designed with the purpose of minimizing the volume of material that is disposed of off-site. Material determined to have a representative concentration that is equal to or less than the interim screening level or project-specific cleanup goal (once established) will be retained on site for return, reuse, and/or restoration. Material determined to have a representative concentration that is greater than this value will be transported off site for disposal in accordance with applicable laws and regulations or treated on site if appropriate based on the selection of the final soil remedy. Material return, reuse, and/or restoration options associated with final disposition on site are discussed in Section 4.

4.0 Return, Reuse, and/or Restoration of Displaced Material

Final on-site disposition alternatives include the return, reuse, and/or restoration of the displaced material. The preferred disposition alternative(s) will be considered on a case-by-case basis with the regulatory agencies, Tribe(s), and affected land owner(s), as suitable material is identified. Material types may differ by physical or chemical properties, and therefore the preferred on-site disposition alternative may also vary. Alternatives that have been preliminarily identified include, but are not limited to:

- Replacement of material into original borings, trenches, or excavations, from which they were removed.
- Replacement of material into borings, trenches, or excavations other than those from which they were removed.
- Creation of topographical or landscape barriers to protect sensitive areas.
- Creation of berms or other structures (e.g., gabions) to prevent erosion.
- On-site road maintenance (this alternative may require sorting the material for different physical sizes).
- Stockpiling in designated areas.

The above list of final on-site disposition alternatives is preliminary, and should not be considered complete. Further, if material is found to contain concentrations of volatile organic compounds it may not be suitable for return, reuse, and/or restoration near buildings where vapor intrusion would be of concern. Coordination with agencies, Tribe(s), and affected land owners is critical in design of the work plan to identify the preferred on-site disposition alternative(s) and communication milestones, so the material can be efficiently managed.

Material displaced as part of past remediation project activities was managed in accordance with project-specific work plans. As a result, some material has been retained at the site because contaminant concentrations were below the Interim Screening Level~~ (previously displaced material that has exceeded these levels was disposed off-site in accordance with the work plans)~~. Therefore, previously displaced material is available for the return, reuse, and/or restoration alternatives included in the bullets above, or as additional uses are developed. As of June 2012, the estimated volume of material that has been retained and stockpiled through past remediation project activities is approximately 30 to 35 cubic yards.

TABLE 1

Reference List of Potentially Applicable Analytes and Associated Screening Levels (rev. July 2015)

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level		Interim Screening Level Source	Hazardous Waste Disposal Criteria
Dioxins and Furans (ng/kg)					
	1,2,3,4,6,7,8-HpCDD	NE		Not Established	NE
	1,2,3,4,6,7,8-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8,9-HpCDF	NE		Not Established	NE
	1,2,3,4,7,8-HxCDD	NE		Not Established	NE
	1,2,3,4,7,8-HxCDF	NE		Not Established	NE
	1,2,3,6,7,8-HxCDD	NE		Not Established	NE
	1,2,3,6,7,8-HxCDF	NE		Not Established	NE
	1,2,3,7,8,9-HxCDD	NE		Not Established	NE
	1,2,3,7,8,9-HxCDF	NE		Not Established	NE
	1,2,3,7,8-PeCDD	4.8		EPA Residential RSL	NE
	1,2,3,7,8-PeCDF	NE		Not Established	NE
	2,3,4,6,7,8-HxCDF	NE		Not Established	NE
	2,3,4,7,8-PeCDF	NE		Not Established	NE
	2,3,7,8-TCDD	4.8		EPA Residential RSL	See Table 2
	2,3,7,8-TCDF	NE		Not Established	NE
	OCDD	NE		Not Established	NE
	OCDF	NE		Not Established	NE
	TEQ Avian	16		Soil Ecological Comparison Value (ECV)	NE
	TEQ Human	50		DTSC HHRA Note 2	NE
	TEQ Mammals	1.6		Soil Ecological Comparison Value (ECV)	NE
Metals (mg/kg)					
	Aluminum	16,400		Background Level	NE
	Antimony	0.285		Soil Ecological Comparison Value (ECV)	See Table 2
	Arsenic	11	*	Background Level	See Table 2
	Barium	410	*	Background Level	See Table 2
	Beryllium	0.672		Background Level	See Table 2
	Cadmium	1.1	*	Background Level	See Table 2
	Calcium	66,500		Background Level	NE
	Chromium, Hexavalent	0.83	*	Background Level	See Table 2
	Chromium, total	39.8	*	Background Level	See Table 2
	Cobalt	12.7	*	Background Level	See Table 2
	Copper	16.8		Background Level	See Table 2
	Cyanide	0.9		Soil Ecological Comparison Value (ECV)	NE
	Iron	55,000		EPA Residential RSL	NE
	Lead	8.39	*	Background Level	See Table 2
	Magnesium	12,100		Background Level	NE
	Manganese	402	*	Background Level	NE
	Mercury	0.0125		Soil Ecological Comparison Value (ECV)	See Table 2
	Molybdenum	1.37	*	Background Level	See Table 2
	Nickel	27.3	*	Background Level	See Table 2
	Potassium	4,400		Background Level	NE
	Selenium	1.47	*	Background Level	See Table 2
	Silver	5.15		Soil Ecological Comparison Value (ECV)	See Table 2
	Sodium	2,070		Background Level	NE
	Thallium	0.78		EPA Residential RSL	See Table 2
	Vanadium	52.2	*	Background Level	See Table 2
	Zinc	58	*	Background Level	See Table 2

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Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Pesticides (µg/kg)				
	4,4-DDD	2.1	Soil Ecological Comparison Value (ECV)	See Table 2
	4,4-DDE	2	EPA Residential RSL	See Table 2
	4,4-DDT	1.9	EPA Residential RSL	See Table 2
	Aldrin	39	EPA Residential RSL	See Table 2
	alpha-BHC	86	EPA Residential RSL	NE
	alpha-Chlordane	470	Soil Ecological Comparison Value (ECV)	See Table 2
	beta-BHC	300	EPA Residential RSL	NE
	delta-BHC	300	EPA Residential RSL	NE
	Dieldrin	5	Soil Ecological Comparison Value (ECV)	See Table 2
	Endo sulfan I	470,000	EPA Residential RSL	NE
	Endo sulfan II	470,000	EPA Residential RSL	NE
	Endosulfan sulfate	470,000	EPA Residential RSL	NE
	Endrin	19,000	EPA Residential RSL	See Table 2
	Endrin aldehyde	19,000	EPA Residential RSL	NE
	Endrin ketone	19,000	EPA Residential RSL	NE
	gamma-BHC (Lindane)	570	EPA Residential RSL	See Table 2
	gamma-Chlordane	0.43	DTSC-Residential SLs	See Table 2
	Heptachlor	130	EPA Residential RSL	See Table 2
	Heptachlor Epoxide	70	EPA Residential RSL	See Table 2
	Methoxychlor	320,000	EPA Residential RSL	See Table 2
	Toxaphene	490	EPA Residential RSL	See Table 2
Polyaromatic Hydrocarbons (µg/kg)				
	1-Methyl naphthalene	18,000	EPA Residential RSL	NE
	2-Methyl naphthalene	240,000	EPA Residential RSL	NE
	Acenaphthene	3,600,000	EPA Residential RSL	NE
	Acenaphthylene	3,600,000	EPA Residential RSL	NE
	Anthracene	18,000,000	EPA Residential RSL	NE
	B(a)P Equivalent	16	EPA Residential RSL	NE
	Benzo (a) anthracene	160	EPA Residential RSL	NE
	Benzo (a) pyrene	16	EPA Residential RSL	NE
	Benzo (b) fluoranthene	160	EPA Residential RSL	NE
	Benzo (ghi) perylene	1,800,000	EPA Residential RSL	NE
	Benzo (k) fluoranthene	0.39	DTSC-Residential SLs	NE
	Chrysene	3.9	DTSC-Residential SLs	NE
	Dibenzo (a,h) anthracene	16	EPA Residential RSL	NE
	Fluoranthene	2,400,000	EPA Residential RSL	NE
	Fluorene	2,400,000	EPA Residential RSL	NE
	Indeno (1,2,3-cd) pyrene	160	EPA Residential RSL	NE
	Naphthalene	3,800	EPA Residential RSL	NE
	PAH High molecular weight	1,160	Soil Ecological Comparison Value (ECV)	NE
	PAH Low molecular weight	10,000	Soil Ecological Comparison Value (ECV)	NE
	Phenanthrene	1,800,000	EPA Residential RSL	NE
	Pyrene	1,800,000	EPA Residential RSL	NE
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1016	0.23	DTSC-Residential SLs	See Table 2
	Aroclor 1221	170	EPA Residential RSL	See Table 2

TABLE 1

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Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Polychlorinated Biphenyls (µg/kg)				
	Aroclor 1232	170	EPA Residential RSL	See Table 2
	Aroclor 1242	230	EPA Residential RSL	See Table 2
	Aroclor 1248	230	EPA Residential RSL	See Table 2
	Aroclor 1254	240	EPA Residential RSL	See Table 2
	Aroclor 1260	240	EPA Residential RSL	See Table 2
	Aroclor 1262	240	EPA Residential RSL	See Table 2
	Aroclor 1268	240	EPA Residential RSL	See Table 2
	Total PCBs	204	Soil Ecological Comparison Value (ECV)	See Table 2
Semivolatile Organic Compounds (µg/kg)				
	1,1´-Biphenyl	47,000	EPA Residential RSL	NE
	1,2,4,5-Tetrachlorobenzene	23,000	EPA Residential RSL	NE
	1,4-Dioxane	5,300	EPA Residential RSL	NE
	2,3,4,6-Tetrachlorophenol	1,900,000	EPA Residential RSL	NE
	2,4,5-Trichlorophenol	6,300,000	EPA Residential RSL	See Table 2
	2,4,6-Trichlorophenol	7.5	DTSC-Residential SLs	See Table 2
	2,4-Dichlorophenol	190,000	EPA Residential RSL	NE
	2,4-Dimethylphenol	1,300,000	EPA Residential RSL	NE
	2,4-Dinitrophenol	130,000	EPA Residential RSL	NE
	2,4-Dinitrotoluene	1,700	EPA Residential RSL	See Table 2
	2,6-Dinitrotoluene	360	EPA Residential RSL	NE
	2-Chloro naphthalene	4,800,000	EPA Residential RSL	NE
	2-Chlorophenol	390,000	EPA Residential RSL	NE
	2-Methylphenol (o-Cresol)	3,200,000	EPA Residential RSL	See Table 2
	2-Nitroaniline	630,000	EPA Residential RSL	NE
	3,3-Dichlorobenzidene	1,200	EPA Residential RSL	NE
	3-Nitroaniline	630,000	EPA Residential RSL	NE
	4,6-Dinitro-2-methylphenol	5,100	EPA Residential RSL	NE
	4-Chloro-3-methylphenol	6,300,000	EPA Residential RSL	NE
	4-Chloroaniline	2,700	EPA Residential RSL	NE
	4-Methylphenol (p-Cresol)	500	Soil Ecological Comparison Value (ECV)	See Table 2
	4-Nitroaniline	27,000	EPA Residential RSL	NE
	Acetophenone	7,800,000	EPA Residential RSL	NE
	Atrazine	2,400	EPA Residential RSL	NE
	Benzaldehyde	7,800,000	EPA Residential RSL	NE
	Benzoic acid	250,000,000	EPA Residential RSL	NE
	Benzyl alcohol	6,300,000	EPA Residential RSL	NE
	Bis (2-chloroethoxy) methane	190,000	EPA Residential RSL	NE
	Bis (2-ethylhexyl) phthalate	2,870	Soil Ecological Comparison Value (ECV)	NE
	Butyl benzyl phthalate	290,000	EPA Residential RSL	NE
	Caprolactam	31,000,000	EPA Residential RSL	NE
	Carbazole	1,600,000	EPA Residential RSL	NE
	Dibenzofuran	73,000	EPA Residential RSL	NE
	Diethyl phthalate	51,000,000	EPA Residential RSL	NE
	Dimethyl phthalate	51,000,000	EPA Residential RSL	NE
	Di-N-butyl phthalate	46.9	Soil Ecological Comparison Value (ECV)	NE
	Di-N-octyl phthalate	630,000	EPA Residential RSL	NE
	Hexachlorobenzene	210	EPA Residential RSL	See Table 2

TABLE 1
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Management Protocol for Handling and Disposition of Displaced Material
PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Semivolatile Organic Compounds (µg/kg)				
	Hexachloroethane	1,800	EPA Residential RSL	See Table 2
	N-Nitroso-di-n-propylamine	78	EPA Residential RSL	NE
	N-nitrosodiphenylamine	110,000	EPA Residential RSL	NE
	Pentachlorophenol	1,000	EPA Residential RSL	See Table 2
	Phenol	19,000,000	EPA Residential RSL	NE
Total Petroleum Hydrocarbons (mg/kg)				
	TPH as diesel	240	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as gasoline	770	SF RWQCB ESL for direct exposure (2013)	NE
	TPH as motor oil	10,000	SF RWQCB ESL for direct exposure (2013)	NE
Volatile Organic Compounds (µg/kg)				
	1,1,1,2-Tetrachloroethane	550	DTSC-Residential SLs	NE
	1,1,1-Trichloroethane	1,700	DTSC-Residential SLs	NE
	1,1,2,2-Tetrachloroethane	600	EPA Residential RSL	NE
	1,1,2-Trichloroethane	1,100	EPA Residential RSL	NE
	1,1,2-Trichlorotrifluoroethane (Freon 113)	40,000,000	EPA Residential RSL	NE
	1,1-Dichloroethane	1,600	DTSC-Residential SLs	NE
	1,1-Dichloroethene	230,000	EPA Residential RSL	See Table 2
	1,1-Dichloropropene	1,800	EPA Residential RSL	NE
	1,2,3-Trichlorobenzene	63,000	EPA Residential RSL	NE
	1,2,3-Trichloropropane	5.1	EPA Residential RSL	NE
	1,2,4-Trichlorobenzene	24,000	EPA Residential RSL	NE
	1,2,4-Trimethylbenzene	58,000	EPA Residential RSL	NE
	1,2-Dibromo-3-chloropropane	5.3	EPA Residential RSL	NE
	1,2-Dibromoethane	7.2	DTSC-Residential SLs	NE
	1,2-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,2-Dichloroethane	460	EPA Residential RSL	See Table 2
	1,2-Dichloropropane	1,000	EPA Residential RSL	NE
	1,3,5-Trimethylbenzene	210	DTSC-Residential SLs	NE
	1,3-Dichlorobenzene	1,800,000	EPA Residential RSL	NE
	1,3-Dichloropropane	420	DTSC-Residential SLs	NE
	1,4-Dichlorobenzene	2,600	EPA Residential RSL	See Table 2
	2,2-Dichloropropane	1,600,000	EPA Residential RSL	NE
	2-Chlorotoluene	480	DTSC-Residential SLs	NE
	2-Hexanone	200,000	EPA Residential RSL	NE
	4-Isopropyltoluene	1,900,000	EPA Residential RSL	NE
	Acetone	61,000,000	EPA Residential RSL	NE
	Acrolein	140	EPA Residential RSL	NE
	Acrylonitrile	0.068	DTSC-Residential SLs	NE
	Benzene	0.33	DTSC-Residential SLs	See Table 2
	Bis (2-chloroethyl) ether	230	EPA Residential RSL	NE
	Bis (2-chloroisopropyl) ether	4,900	EPA Residential RSL	NE
	Bromobenzene	290,000	EPA Residential RSL	NE
	Bromochloromethane	150,000	EPA Residential RSL	NE
	Bromodichloromethane	280	DTSC-Residential SLs	NE
	Bromoform	19,000	EPA Residential RSL	NE
	Bromomethane	6,800	EPA Residential RSL	NE

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Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	Interim Screening Level	Interim Screening Level Source	Hazardous Waste Disposal Criteria
Volatile Organic Compounds (µg/kg)				
	Carbon disulfide	770,000	EPA Residential RSL	NE
	Carbon tetrachloride	0.099	DTSC-Residential SLs	See Table 2
	Chlorobenzene	280,000	EPA Residential RSL	See Table 2
	Chloroethane	3.1	DTSC-Residential SLs	NE
	Chloroform	320	EPA Residential RSL	See Table 2
	Chloromethane	110,000	EPA Residential RSL	NE
	cis-1,2-Dichloroethene	19	DTSC-Residential SLs	NE
	cis-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Cyclohexane	6,500,000	EPA Residential RSL	NE
	Dibromochloromethane	750	EPA Residential RSL	NE
	Dibromomethane	23,000	EPA Residential RSL	NE
	Dichlorodifluoromethane	87,000	EPA Residential RSL	NE
	Ethylbenzene	5,800	EPA Residential RSL	NE
	Hexachlorobutadiene	1,200	EPA Residential RSL	See Table 2
	Hexachlorocyclopentadiene	1,800	EPA Residential RSL	NE
	Isophorone	570,000	EPA Residential RSL	NE
	Isopropylbenzene	1,900,000	EPA Residential RSL	NE
	m,p-Xylenes	550,000	EPA Residential RSL	NE
	Methyl acetate	24,000	DTSC-Residential SLs	NE
	Methyl ethyl ketone	27,000,000	EPA Residential RSL	See Table 2
	Methyl isobutyl ketone	5,300,000	EPA Residential RSL	NE
	Methyl tert-butyl ether (MTBE)	47,000	EPA Residential RSL	NE
	Methylcyclohexane	6,500,000	EPA Residential RSL	NE
	Methylene chloride	5.5	DTSC-Residential SLs	NE
	N-Butylbenzene	1,200	DTSC-Residential SLs	NE
	Nitrobenzene	5,100	EPA Residential RSL	See Table 2
	N-Propylbenzene	3,800,000	EPA Residential RSL	NE
	o-Xylene	650,000	EPA Residential RSL	NE
	p-Chlorotoluene	440	DTSC-Residential SLs	NE
	sec-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Styrene	6,000,000	EPA Residential RSL	NE
	tert-Butylbenzene	2,200	DTSC-Residential SLs	NE
	Tetrachloroethene	0.6	DTSC-Residential SLs	See Table 2
	Toluene	1,100	DTSC-Residential SLs	NE
	trans-1,2-Dichloroethene	190	DTSC-Residential SLs	NE
	trans-1,3-Dichloropropene	1,800	EPA Residential RSL	NE
	Trichloroethene	940	EPA Residential RSL	See Table 2
	Trichlorofluoromethane (Freon 11)	730,000	EPA Residential RSL	NE
	Vinyl chloride	59	EPA Residential RSL	See Table 2
	Xylenes, total	650,000	EPA Residential RSL	NE

Notes:

This table presents a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes and screening levels applicable for characterization of displaced material will be determined based on the origin of the material and potential disposition locations.

Interim screening level is background value. If background value is not available then the lesser of the DTSC HHRA Note 3 Residential Screening Levels (DTSC Residential SL) or the ecological comparison value is used. If a DTSC Residential SL is not available, it is the lesser of the USEPA residential regional screening level or the ecological comparison value.

Background	"Final Soil Background Investigation at Pacific Gas and Electric Company Topock Compressor Station, Needles, California" (CH2M HIll 2009c)
DTSC-Residential SLs	Human Health Risk Assessment Note 3 – DTSC-Modified Screening Levels, May 2015.
EPA Residential RSL	United States Environmental Protection Agency Residential Soil Regional Screening Level (THQ=1.0), June 2015.
ECV	Ecological Comparison Values; ECV were calculated as needed for constituents detected during the Part A Phase I sampling (Arcadis 2008)
HHRA Note 2	DTSC Human Health Risk Assessment (HHRA) Note 2: Remedial Goals for Dioxins and Dioxin-like Compounds for Consideration at California Hazardous Waste Sites – Interim (May 2009).
SF RWQCB ESL	San Francisco Bay Regional Water Quality Control Board Environmental Screening Levels for residential direct exposure (2013)
*	One or more screening levels (EPA Residential RSL, DTSC-Residential SLs, ECV, or Soil SL) have values lower than the background level.
NE	not established
mg/kg	milligrams per kilogram
ng/kg	nanograms per kilogram
µg/kg	micrograms per kilogram

TABLE 2

Hazardous Waste Toxicity Characteristic Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Asbetos							
	Asbestos	1%	NE	NE	NE	NE	NE
Dioxins and Furans							
	2,3,7,8-TCDD	0.01	0.01	NE	0.001	NE	NE
Metals							
	Antimony	500	150	NE	15	NE	NE
	Arsenic	500	50	100	5	5	D004
	[j] Barium	10,000	1,000	2,000	100	100	D005
	Beryllium	75	7.5	NE	0.75	NE	NE
	Cadmium	100	10	20	1	1	D006
	Chromium, Hexavalent	500	50	NE	5	NE	NE
	[k] Chromium, total	2,500	50	100	5	5	D007
	Cobalt	8,000	800	NE	80	NE	NE
	Copper	2,500	250	NE	25	NE	NE
	Lead	1,000	50	100	5	5	D008
	Mercury	20	2	4	0.2	0.2	D009
	[l] Molybdenum	3,500	3,500	NE	350	NE	NE
	Nickel	2,000	200	NE	20	NE	NE
	Selenium	100	10	20	1	1	D010
	Silver	500	50	100	5	5	D011
	Thallium	700	70	NE	7	NE	NE
	Vanadium	2,400	240	NE	24	NE	NE
	Zinc	5,000	2,500	NE	250	NE	NE
Pesticides							
	4,4-DDD	1	1	NE	0.1	NE	NE
	4,4-DDE	1	1	NE	0.1	NE	NE
	4,4-DDT	1	1	NE	0.1	NE	NE
	Aldrin	1.4	1.4	NE	0.14	NE	NE
	alpha-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Dieldrin	8	8	NE	0.8	NE	NE
	Endrin	0.2	0.2	0.4	0.02	0.02	D012
	gamma-BHC (Lindane)	4	4	8	0.4	0.4	D013
	gamma-Chlordane	2.5	2.5	0.6	0.25	0.03	D020
	Heptachlor	4.7	4.7	0.16	0.47	0.008	D031
	Heptachlor Epoxide	4.7	4.7	0.16	0.47	0.008	D031
	Methoxychlor	100	100	200	10	10	D014
	Toxaphene	5	5	10	0.5	0.5	D015
Polychlorinated Biphenyls							
	Aroclor 1016	50	50	NE	5	NE	NE
	Aroclor 1221	50	50	NE	5	NE	NE
	Aroclor 1232	50	50	NE	5	NE	NE
	Aroclor 1242	50	50	NE	5	NE	NE
	Aroclor 1248	50	50	NE	5	NE	NE
	Aroclor 1254	50	50	NE	5	NE	NE
	Aroclor 1260	50	50	NE	5	NE	NE
	Aroclor 1262	50	50	NE	5	NE	NE
	Aroclor 1268	50	50	NE	5	NE	NE

TABLE 2

Hazardous Waste Toxicity Characteristic Levels

Management Protocol for Handling and Disposition of Displaced Material

PG&E Topock Compressor Station, Needles, California

Group	Analyte	TTLC [a, i]	STLC [b] Screen	RCRA TC [c] Screen	STLC [d, i] (from WET)	RCRA TC [e] (from TCLP)	EPA HW [f]
		mg/kg	mg/kg	mg/kg	mg/L	mg/L	
Polychlorinated Biphenyls							
	Total PCBs	50	50	NE	5	NE	NE
Semivolatile Organic Compounds							
	2,4-Dinitrotoluene	NE	NE	2.6	NE	0.13	D030
	[g] 2-Methylphenol (o-Cresol)	NE	NE	4,000	NE	200	D023
	[g] 3-Methylphenol (m-Cresol)	NE	NE	4,000	NE	200	D024
	[g] 4-Methylphenol (p-Cresol)	NE	NE	4,000	NE	200	D025
	Hexachlorobenzene	NE	NE	2.6	NE	0.13	D032
	Hexachloroethane	NE	NE	60	NE	3	D034
	Pentachlorophenol	17	17	2,000	1.7	100	D037
Volatile Organic Compounds							
	1,1-Dichloroethene	NE	NE	14	NE	0.7	D029
	1,2-Dichloroethane	NE	NE	10	NE	0.5	D028
	1,4-Dichlorobenzene	NE	NE	150	NE	7.5	D027
	2,4,5-Trichlorophenol	NE	NE	8,000	NE	400	D041
	2,4,6-Trichlorophenol	NE	NE	40	NE	2	D042
	Benzene	NE	NE	10	NE	0.5	D018
	Carbon tetrachloride	NE	NE	10	NE	0.5	D019
	Chlorobenzene	NE	NE	2,000	NE	100	D021
	Chloroform	NE	NE	120	NE	6	D022
	Hexachlorobutadiene	NE	NE	10	NE	0.5	D033
	Methyl ethyl ketone	NE	NE	4,000	NE	200	D035
	Nitrobenzene	NE	NE	40	NE	2	D036
	Tetrachloroethene	NE	NE	14	NE	0.7	D039
	Trichloroethene	2,040	2,040	10	204	0.5	D040
	Vinyl chloride	NE	NE	4	NE	0.2	D043

Notes:

NE	not established
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
EPA HW	Environmental Protection Agency Hazardous Waste Code
TC	Toxicity Characteristic
TTLC	Total Threshold Limit Concentration
STLC	Soluble Threshold Limit Concentration
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure
WET	California Waste Extraction Test

Hazardous waste critiera exist for kepone, 2,4-D, mirex, pyridine, and 2,45-TP (Silvex); however, since they are not contaminants of potential concern at the Topock site, they are excluded from this table.

a Total Threshold Limit Concentration (TTLC) from 22 CCR 66261.24(a)(2). Calculated based on the concentration of the elements, not the compounds.

b Screening level is 10x Soluble Threshold Limit Concentraction (STLC). If screening level is exceeded in total analysis, California Waste Extraction Test (WET) should be run to evaluate whether STLC is exceeded.

c Screening level is 20x RCRA Toxicity Characteristic (TC). If screening level is exceeded in total analysis, Toxicity Characteristic Leaching Procedure (TCLP) should be run to evaluate whether RCRA TC is exceeded.

d Soluble threshold limit concentration from 22 CCR 66261.24(a)(2), measured using the WET. Calculated based on the concentration of the elements, not the compounds.

e RCRA TC level from 22 CCR 66261.24(a)(1), measured using the TCLP.

f A waste is assigned a RCRA waste code for each constituent where the results of the TCLP equal or exceed the RCRA TC level.

g If o-, m- and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/L.

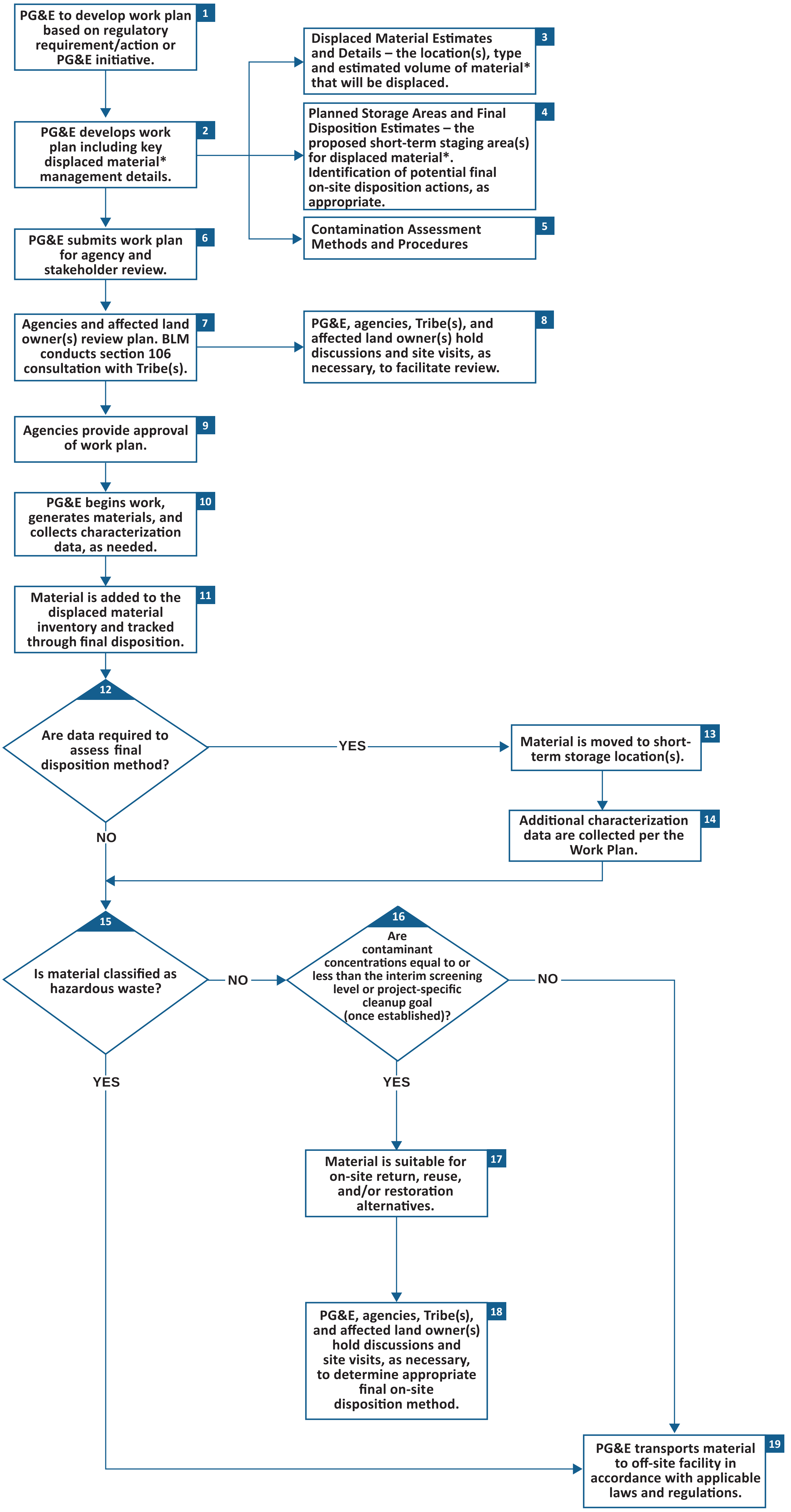
h This footnote letter skipped intentionally.

i In the case of asbestos and elemental metals, the specified concentration limits apply only if the substances are in a friable, powdered or finely divided state. Asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

j TTLC and STLC exclude barite. TTLC excludes barium sulfate.

k For STLC, if the waste does not exceed the RCRA TC or exhibit another RCRA hazardous characteristic, the STLC is 560 mg/L, not 5 mg/L.

l For TTLC, excludes molybdenum disulfide.



Notes:

* Throughout this figure the term "material" is defined as soil and rock that may be displaced (i.e., removed from the Earth) as a result of work activities including drilling, excavation, sample collection, testing, construction, grading, or other activities. This does not include materials that were not part of the natural site condition (e.g. building materials, equipment, or imported fill).

Throughout this figure, the term “site” refers to the area within the Area of Potential Effect (APE).

FIGURE 1
General Management Protocol for Handling and Disposition of Displaced Site Material
PG&E Topock Remediation Project
Needles, California

LEGEND:

FENCE LINE

NOTES:

1. PARKING SURFACE WILL BE GRAVEL DURING INITIAL CONSTRUCTION, BUT MAY BE PAVED WITH ASPHALT IN THE FUTURE.
2. CONFIGURATION AND COMPOSITION OF THE REMEDY SUPPORT AREA MAY CHANGE OVER THE LIFE OF THE REMEDY. E□PECTED CONFIGURATION DURING CONSTRUCTION IS DEPICTED HERE.
3. FINAL LAYOUT OF TEMPORARY CONSTRUCTION AND LAYDOWN AREAS TO BE DETERMINED BY CONTRACTOR. REPRESENTATIVE USE OF THE AREA IS DEPICTED HERE.

0 30' 60' 90'

SCALE: 1"=30'

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	MSL	JPB	JEF

REVISIONS

APPROVED BY		
JEF	SO	
	SUPV	JPB
	DSGN	MSL
	DWN	AJW
	CHKD	JPB
	OK	JEF
	DATE	6/9/15
	SCALES	1"=30'

TOPOCK GROUNDWATER REMEDIATION PROJECT

CONSTRUCTION
HEAD□UARTERS YARD PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
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LEGEND:

- FENCE LINE
- ELECTRICAL AND TELECOMMUNICATIONS CONNECTION
- FIRE PROTECTION WATER AND SEWER CONNECTION
- WATER CONNECTION

NOTES:

1. CONFIGURATION AND COMPOSITION OF THE REMEDY SUPPORT AREA MAY CHANGE OVER THE LIFE OF THE REMEDY. E□PECTED CONFIGURATION DURING CONSTRUCTION IS DEPICTED HERE.
2. FINAL LAYOUT OF TEMPORARY CONSTRUCTION AND LAYDOWN AREAS TO BE DETERMINED BY CONTRACTOR. REPRESENTATIVE USE OF THE AREA IS DEPICTED HERE.

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	MSL	JPB	JEF

REVISIONS

APPROVED BY		
JEF	SO	
	SUPV	JPB
	DSGN	MSL
	DWN	AJW
	CHKD	JPB
	OK	JEF
	DATE	6/9/15
	SCALES	1"=30'

TOPOCK GROUNDWATER REMEDIATION PROJECT

CONSTRUCTION HEAD□UARTERS UTILITY CONNECTIONS

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
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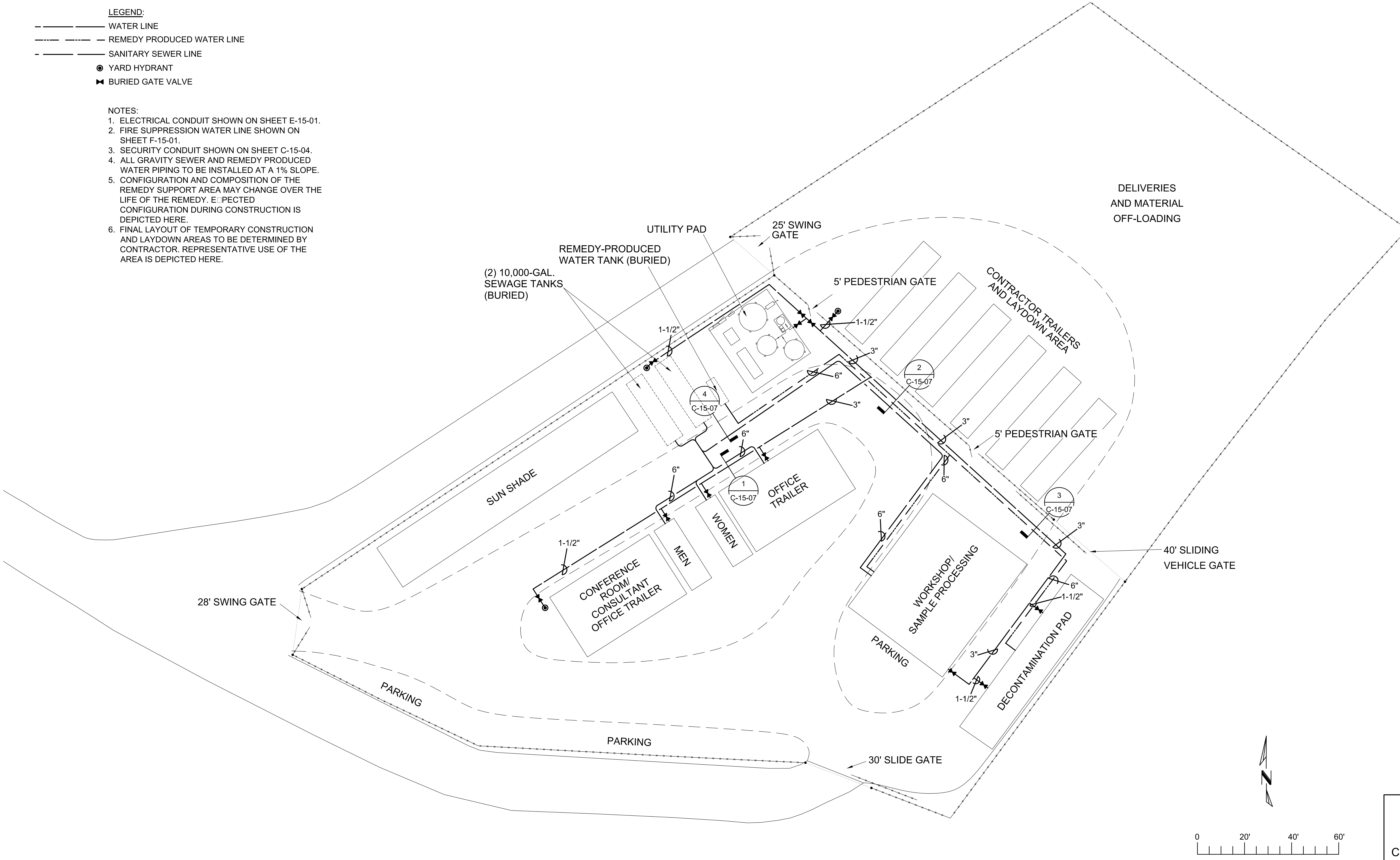
LEGEND:
- WATER LINE
- REMEDY PRODUCED WATER LINE
- SANITARY SEWER LINE
- YARD HYDRANT
- BURIED GATE VALVE

NOTES:
1. ELECTRICAL CONDUIT SHOWN ON SHEET E-15-01.
2. FIRE SUPPRESSION WATER LINE SHOWN ON SHEET F-15-01.
3. SECURITY CONDUIT SHOWN ON SHEET C-15-04.
4. ALL GRAVITY SEWER AND REMEDY PRODUCED WATER PIPING TO BE INSTALLED AT A 1% SLOPE.
5. CONFIGURATION AND COMPOSITION OF THE REMEDY SUPPORT AREA MAY CHANGE OVER THE LIFE OF THE REMEDY. E□PECTED CONFIGURATION DURING CONSTRUCTION IS DEPICTED HERE.
6. FINAL LAYOUT OF TEMPORARY CONSTRUCTION AND LAYDOWN AREAS TO BE DETERMINED BY CONTRACTOR. REPRESENTATIVE USE OF THE AREA IS DEPICTED HERE.



- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING | ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	MSL	JPB	JEF

REVISIONS

APPROVED BY: JEF
SO
SUPV JPB
DSGN MSL
DWN AJW
CHKD JPB
OK JEF
DATE 7/15/15
SCALES 1"=20'

TOPOCK GROUNDWATER REMEDIATION PROJECT

CONSTRUCTION HEAD□UARTERS PIPING PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
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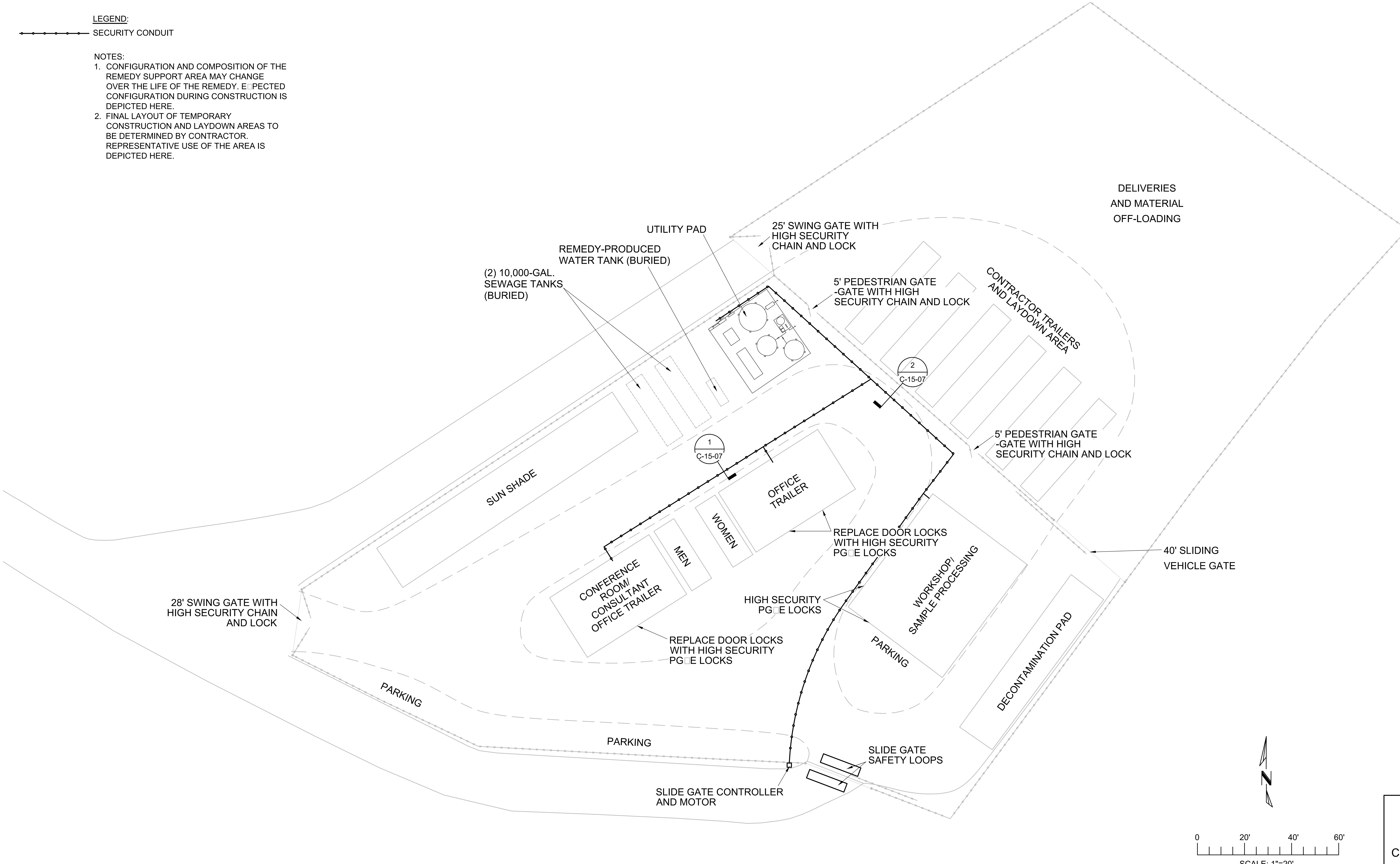
LEGEND:

SECURITY CONDUIT

NOTES:

1. CONFIGURATION AND COMPOSITION OF THE REMEDY SUPPORT AREA MAY CHANGE OVER THE LIFE OF THE REMEDY. E□PECTED CONFIGURATION DURING CONSTRUCTION IS DEPICTED HERE.
2. FINAL LAYOUT OF TEMPORARY CONSTRUCTION AND LAYDOWN AREAS TO BE DETERMINED BY CONTRACTOR. REPRESENTATIVE USE OF THE AREA IS DEPICTED HERE.



- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	JMS	JPB	JEF

REVISIONS

APPROVED BY	JEF
SO	
SUPV	JPB
DSGN	JMS
DWN	AJW
CHKD	JPB
OK	JEF
DATE	7/15/15
SCALES	1"=20'

TOPOCK GROUNDWATER REMEDIATION PROJECT

CONSTRUCTION HEAD□UARTERS SECURITY PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS

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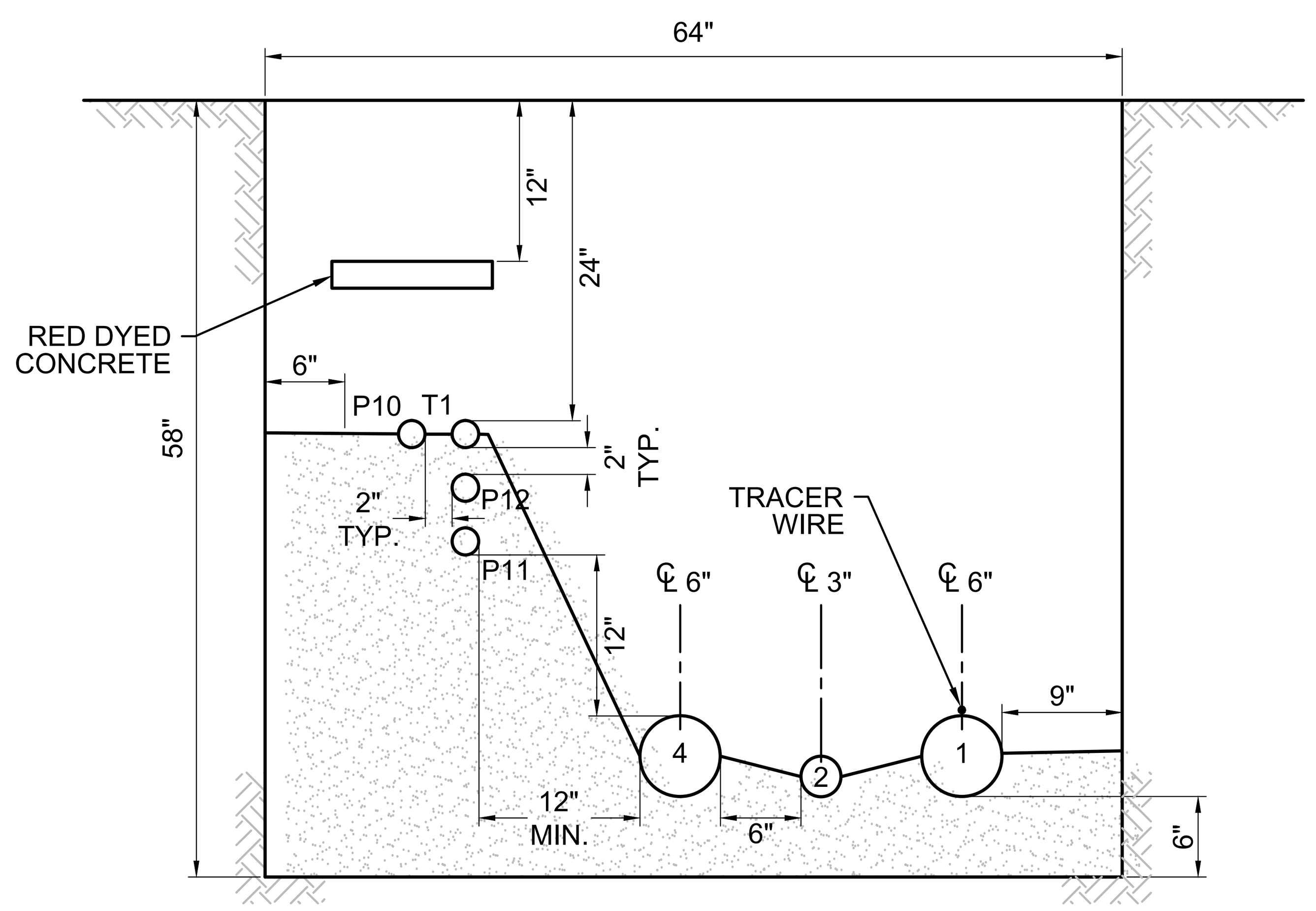

SECTION 1
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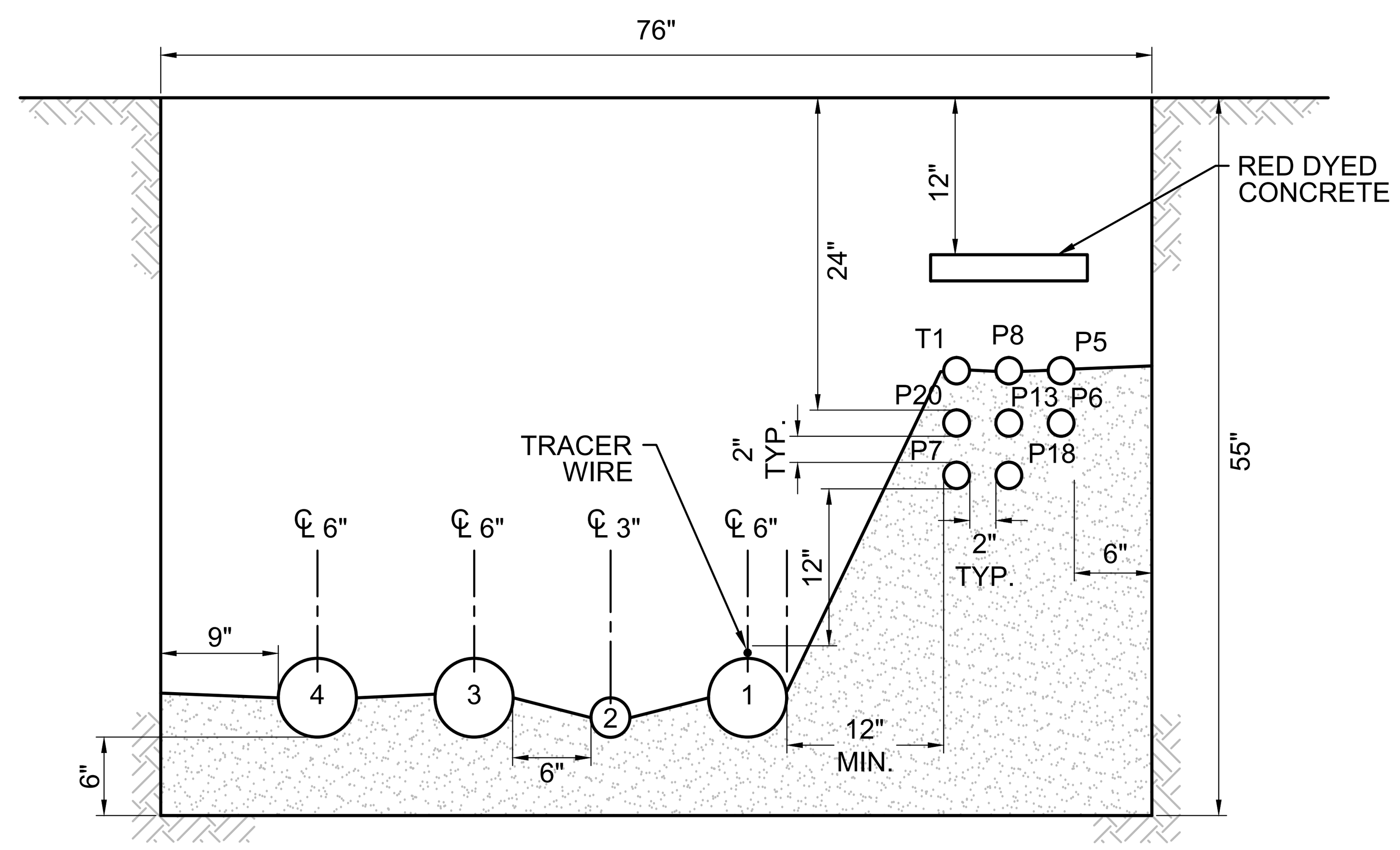
C-15-04
E-15-01
F-15-01



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C-15-04
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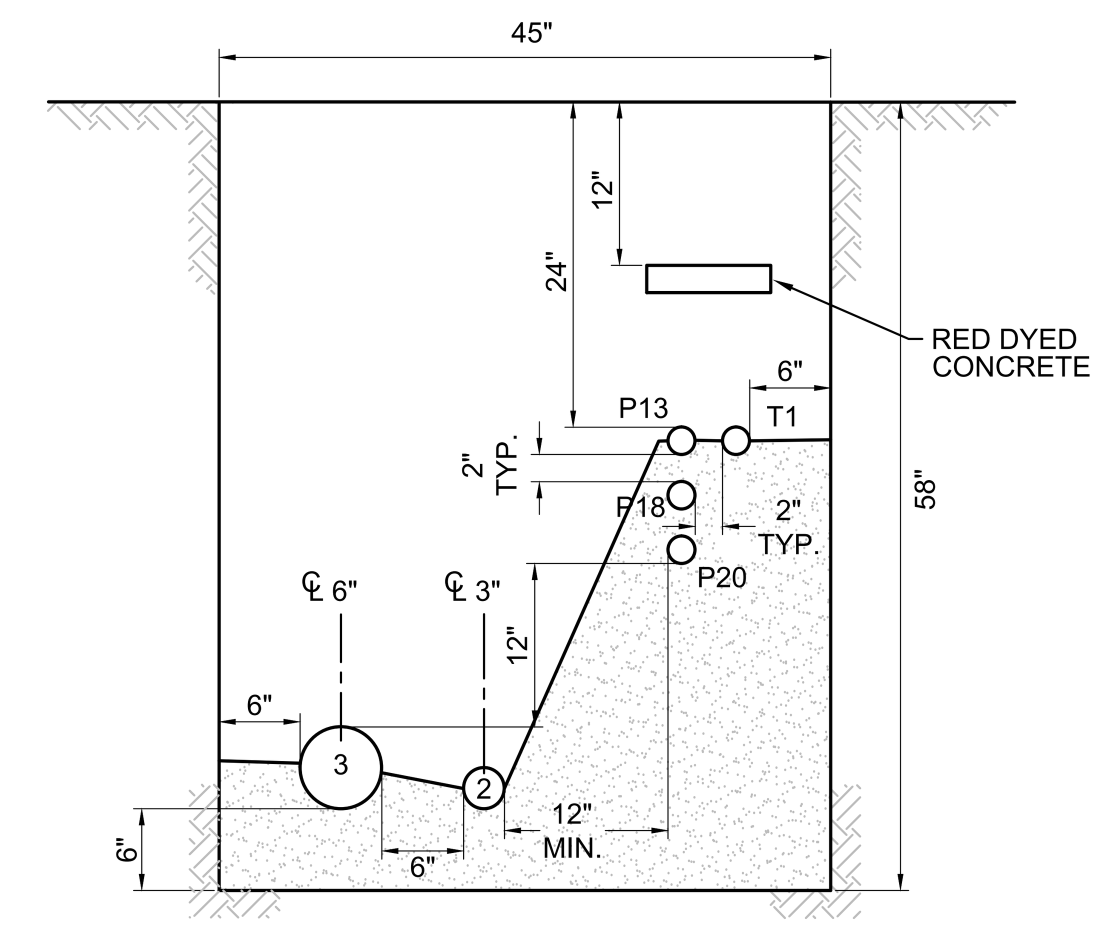
F-15-01



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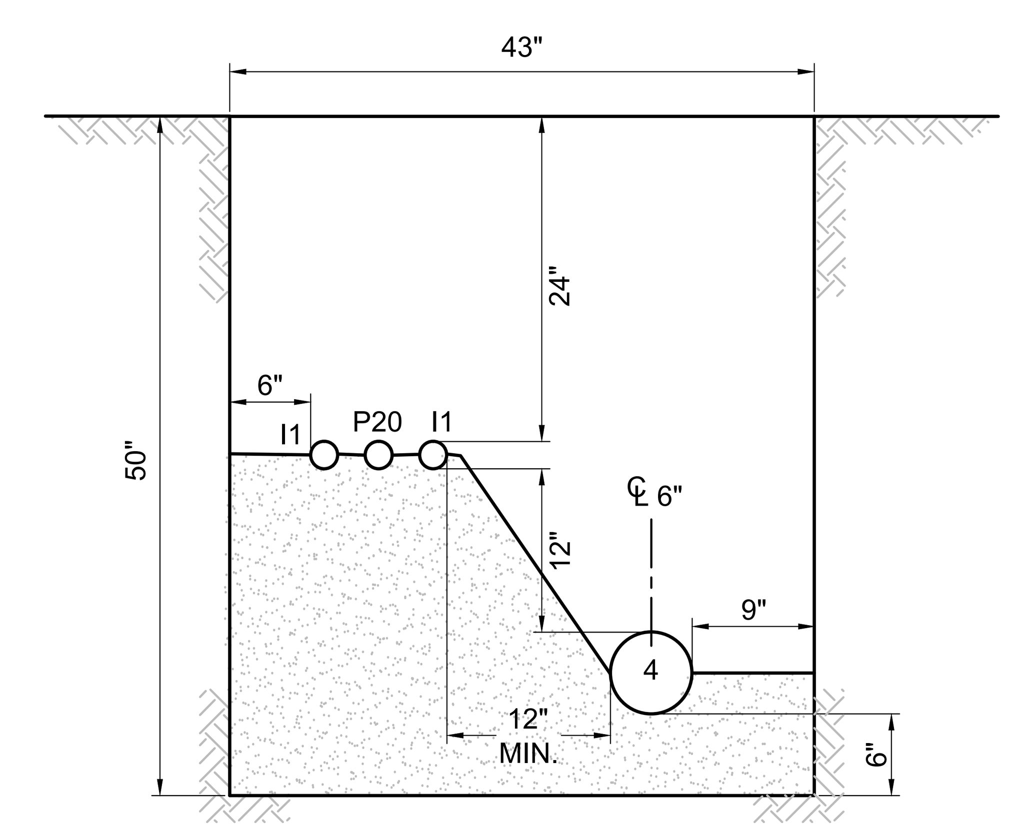
C-15-04
E-15-01
F-15-01



SECTION 4
1"=1'-0"
C-15-03
C-15-04
E-15-01
F-15-01

PIPE ID	SERVICE
1	6" FIRE PROTECTION WATER
2	3" WATER LINE
3	6" REMEDY PRODUCED WATER
4	6" SANITARY SEWER
T1	2" TELECOMMUNICATIONS CONDUIT
I1	2" INSTRUMENTATION CONDUIT
S1	2" SECURITY CONDUIT
P□	POWER CONDUIT, SI□E AS SHOWN ON E-15-03

NOTES:
1. SEE SHEET E-15-03 FOR CONSTRUCTION HEAD□UARTERS YARD AND CONDUIT SCHEDULE.

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING
ARCADIS

REVISIONS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	MSL	JPB	JEF

APPROVED BY: JEF
SO
SUPV JPB
DSGN MSL
DWN AJW
CHKD JPB
OK JEF
DATE 2/2/15
SCALES NONE

TOPOCK GROUNDWATER REMEDIATION PROJECT

CONSTRUCTION HEAD□UARTERS TRENCH SECTIONS

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
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- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	MSL	JPB	JEF
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	MSL	JPB	JEF

REVISIONS

APPROVED BY: JEF

SO	
SUPV	JPB
DSGN	MSL
DWN	AJW
CHKD	JPB
OK	JEF
DATE	6/9/15
SCALES	1"=25'

TOPOCK GROUNDWATER REMEDIATION PROJECT

CONSTRUCTION HEADQUARTERS GRADING PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
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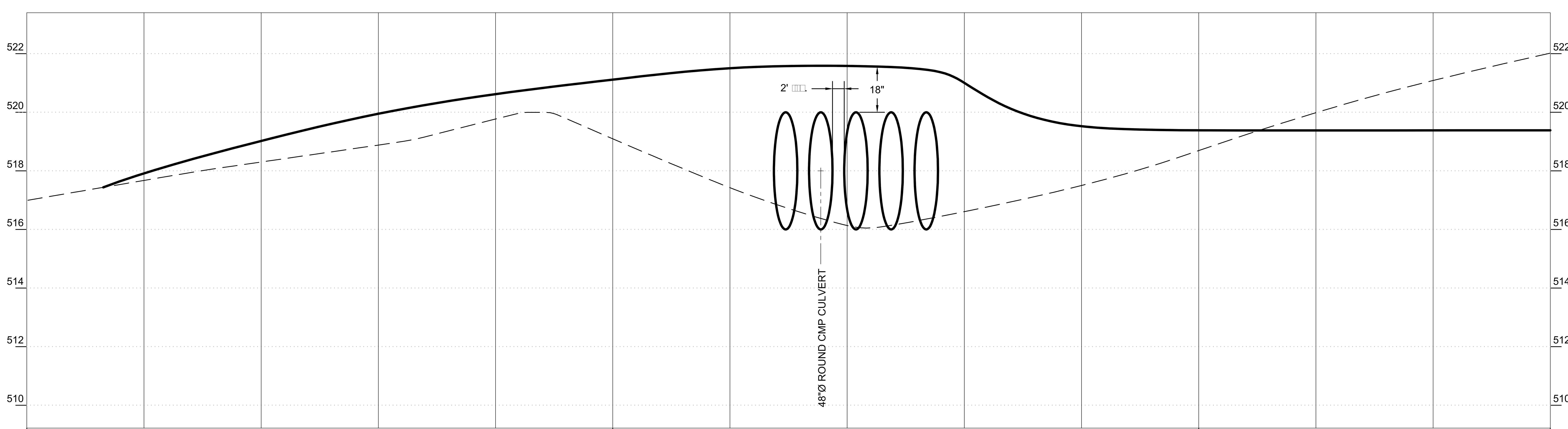
0 10 20 30
HORI□: SCALE: 1"=20'

0 2 4 6
VERT: SCALE: 1"=2'

CHQ ENTRANCE ROAD - PLAN

(SCALE: 1" = 10')



CHQ ENTRANCE ROAD - PROFILE

(SCALE: 1" = 10')

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	MSL	JPB	JEF

REVISIONS

APPROVED BY	
SO	
SUPV	
DSGN	
DWN	
CHKD	
OK	
DATE	8/5/15
SCALES	

TOPOCK GROUNDWATER REMEDIATION PROJECT

CH□ ENTRANCE ROAD-
PLAN AND PROFILE
STA 0□00 TO STA 2□34

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
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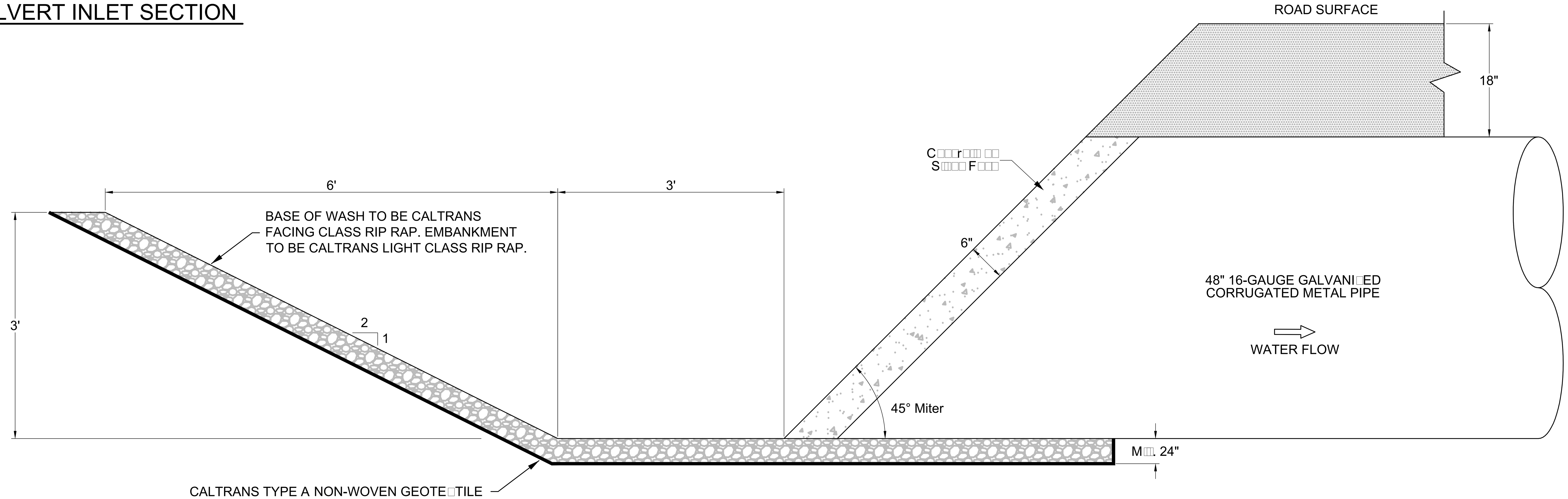
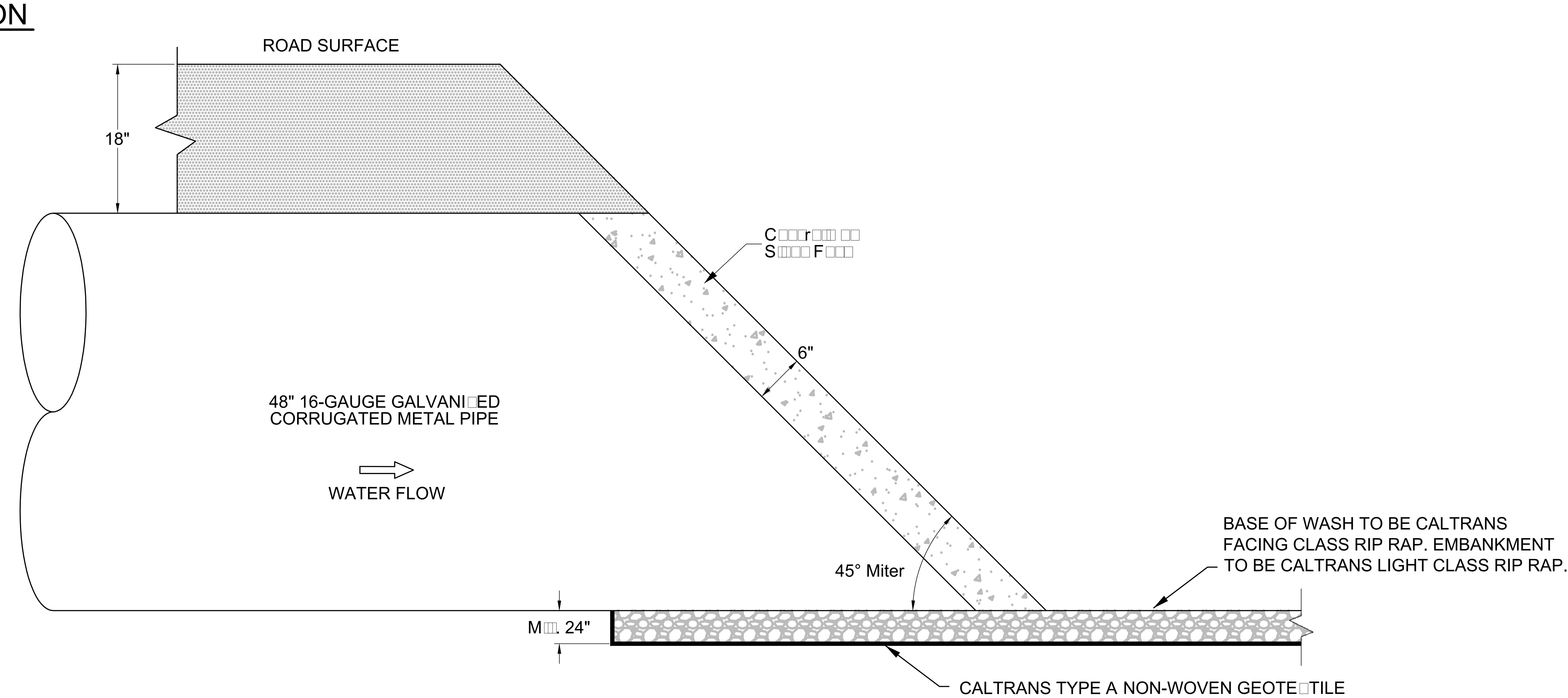
N1808

① CULVERT INLET SECTION
1"=1'-0"
C-15-09



② CULVERT OUTLET SECTION
1"=1'-0"
C-15-09



- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING
ARCADIS

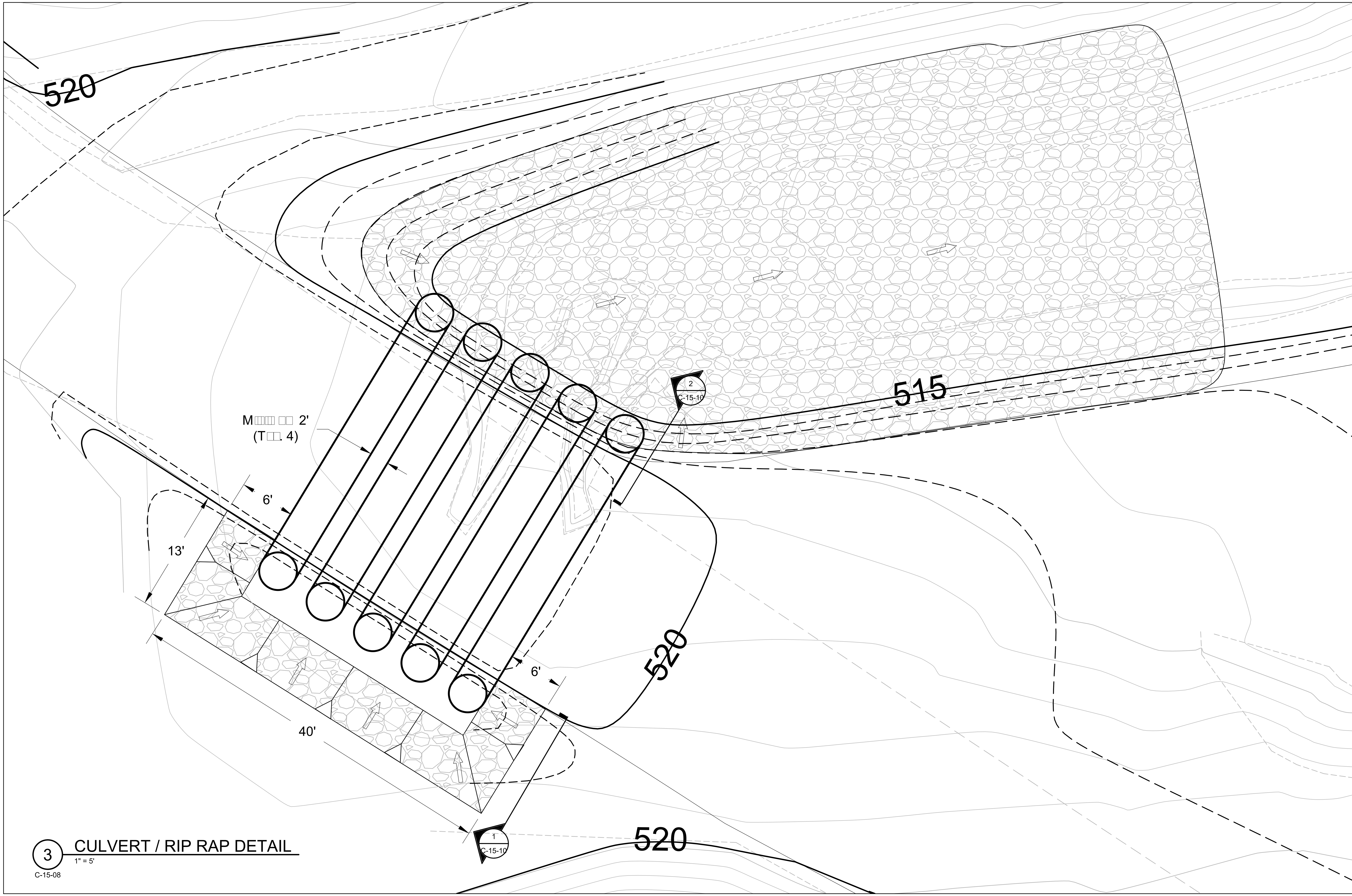
NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	MSL	JPB	JEF

REVISIONS

APPROVED BY	JEF
SO	
SUPV	JPB
DSGN	MSL
DWN	AJW
CHKD	JPB
OK	JEF
DATE	6/9/15
SCALES	1"=1'

TOPOCK GROUNDWATER REMEDIATION PROJECT
CH□ ENTRANCE ROAD-SECTION
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
C-15-10	REV 0



3 CULVERT / RIP RAP DETAIL
1" = 5'
C-15-08

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
		REVISIONS					

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	MSL	JPB	JEF
		REVISIONS					

APPROVED BY	JEF
SO	
SUPV	JPB
DSGN	MSL
DWN	AJW
CHKD	JPB
OK	JEF
DATE	6/9/15
SCALES	1"=5'

TOPOCK GROUNDWATER REMEDIATION PROJECT

CH□ ENTRANCE ROAD-
SECTION

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
C-15-11	REV 0

08/05/2015, 11:50, G:\Gr□□□□\AR□TOPOCK-01 S□□□□100% DWG\C-C□□□\C-15-11.d□□, T□□: C-15-11

H1806

CONSTRUCTION HEADQUARTERS YARD CONDUIT AND CABLE SCHEDULE

CONDUIT	CONDUIT SIZE	ORIGIN	DESTINATION/ WELL (#)	CONDUCTOR	NOTES
P1	4"	PRIMARY POLE	UTILITY PAD	EMPTY 4" CONDUIT WITH PULL LINE	
P2	4"	UTILITY PAD	ECB-1/MAIN PANEL DP-M	(2) SETS OF (4) 600 KCM	
P3	2"	DP-M	TRAILER #1	(4) #1/0, (1) #6 GND (CONTRACTOR TRAILER #1)	
P4	2"	DP-M	TRAILER #2	(4) #1/0, (1) #6 GND (CONTRACTOR TRAILER #2)	
P5	2"	DP-M	TRAILER #3	(4) #1/0, (1) #6 GND (CONTRACTOR TRAILER #3)	
P6	2"	DP-M	TRAILER #4	(4) #1/0, (1) #6 GND (CONTRACTOR TRAILER #4)	
P7	2"	DP-M	TRAILER #5	(4) #1/0, (1) #6 GND (CONTRACTOR TRAILER #5)	
P8	2"	DP-M	TRAILER #6	(4) #1/0, (1) #6 GND (CONTRACTOR TRAILER #6)	
P9	2"	DP-M	WORKSHOP/LAB	(4) #3/0, (1) #6 GND	
P10	2"	DP-M	CONFERENCE ROOM	(4) #1/0, (1) #6 GND	
P11	1-1/2"	DP-M	WOMEN'S RESTROOM	(4) #1, (1) #8 GND (WOMEN'S RESTROOM)	
P12	1-1/2"	DP-M	MEN'S RESTROOM	(4) #1, (1) #8 GND (MEN'S RESTROOM)	
P13	1"	DP-M	DECONTAMINATION PAD	(2) #8, (1) #8 GND (DECON PAD)	(2) SETS
P14	2"	DP-M	OFFICE TRAILER	(4) #1 / 0, (1) #6 GND	
P15	2"	DP-M	WATER SUPPLY PUMP	(3) #4, (1) #6 GND	
P16	2"	DP-M	FIRE WATER PUMP	(3) #3/0, (1) #6 GND	
P17	4"	ECB-1	ATS/GENERATOR	(2) SETS OF (4) 600 KCM, (1) #1/0 GND	
P18	2"	GRID-TIE INVERTER	TIE JUNCTION BOX	(4) #1/0 USE, (1) #6 GND	
P19	4"	ATS/GENERATOR	DP-M	(2) SETS OF (4) 600 KCM, (1) #1/0 GND	
P20	2"	SUN SHADE	GRID TIE INVERTER	(2) #1 USE, (1) #6 GND	
T1	2"	TELECOMM PANEL	WORKSHOP, OFFICE/CONF.	EMPTY 2" CONDUIT WITH PULL LINE	
S1	2"	WORKSHOP/LAB	GATE OPERATOR	EMPTY 2" CONDUIT WITH PULL LINE	
I1	2"	WATER TANK	SEWAGE TANK	EMPTY 2" CONDUIT WITH PULL LINE	

P=Power, F=Fiber Optic (F.O.), C=Controls, T=Telecomm, S=Security, I=Instrumentation
ALL POWER CONDUCTORS ARE AWG XHHW UNLESS OTHERWISE NOTED

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	BSS	JPB	JMS
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	JMS	JPB	JEF

REVISIONS

APPROVED BY: JEF

SO	
SUPV	JPB
DSGN	JMS
DWN	AJW
CHKD	JPB
OK	JEF
DATE	2/2/15
SCALES	1" = 20'

TOPOCK GROUNDWATER REMEDIATION PROJECT

CONSTRUCTION HEADQUARTERS
ELECTRICAL PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
E-15-03
REV 1

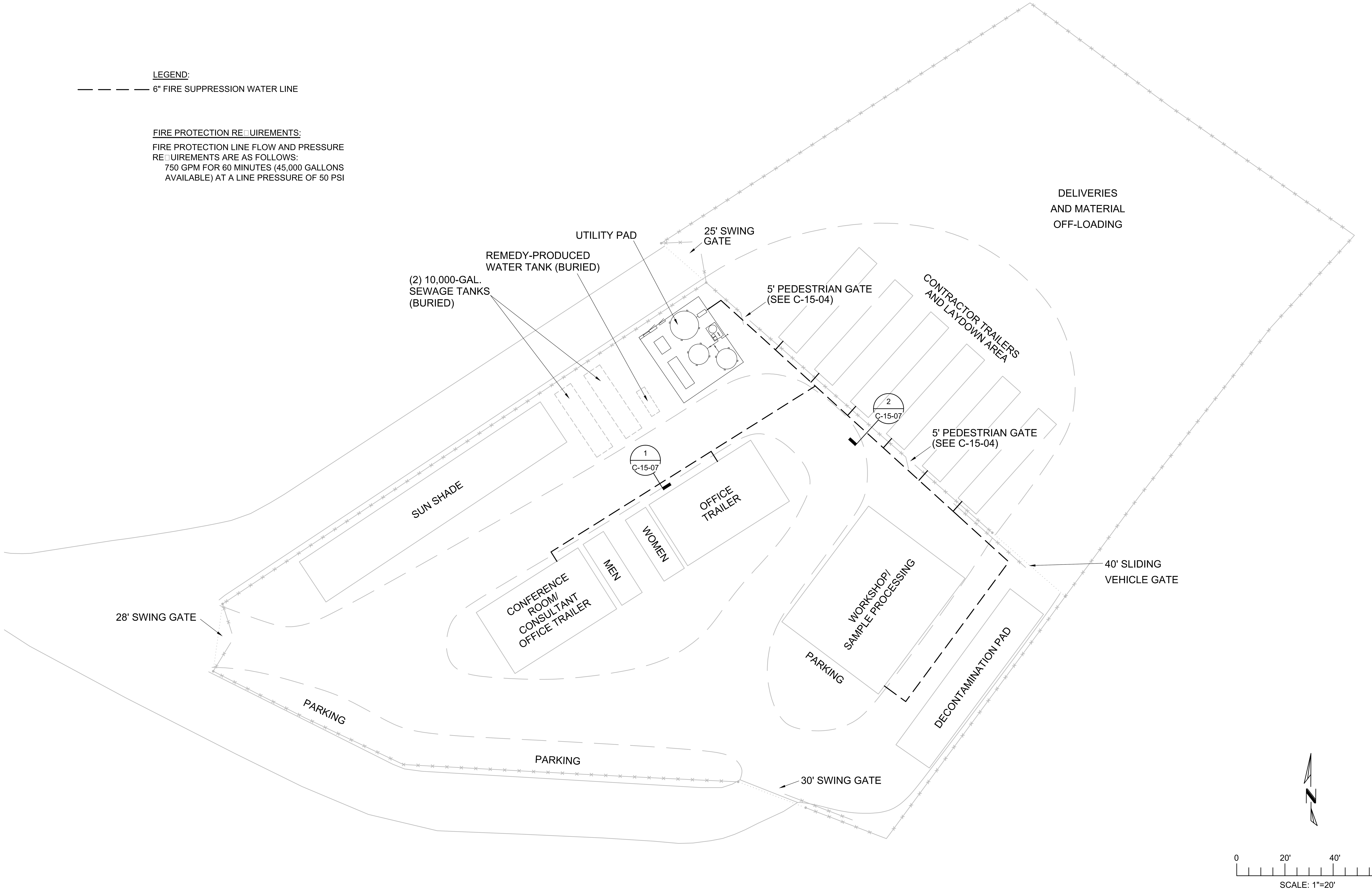
N1808

LEGEND:

— — — — 6" FIRE SUPPRESSION WATER LINE

FIRE PROTECTION RE□UIREMENTS:

FIRE PROTECTION LINE FLOW AND PRESSURE RE□UIREMENTS ARE AS FOLLOWS:
750 GPM FOR 60 MINUTES (45,000 GALLONS AVAILABLE) AT A LINE PRESSURE OF 50 PSI



- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
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0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	JMS	JPB	JEF

REVISIONS

APPROVED BY	JEF
SO	
SUPV	JPB
DSGN	JMS
DWN	AJW
CHKD	JPB
OK	JEF
DATE	2/2/15
SCALES	1" = 20'

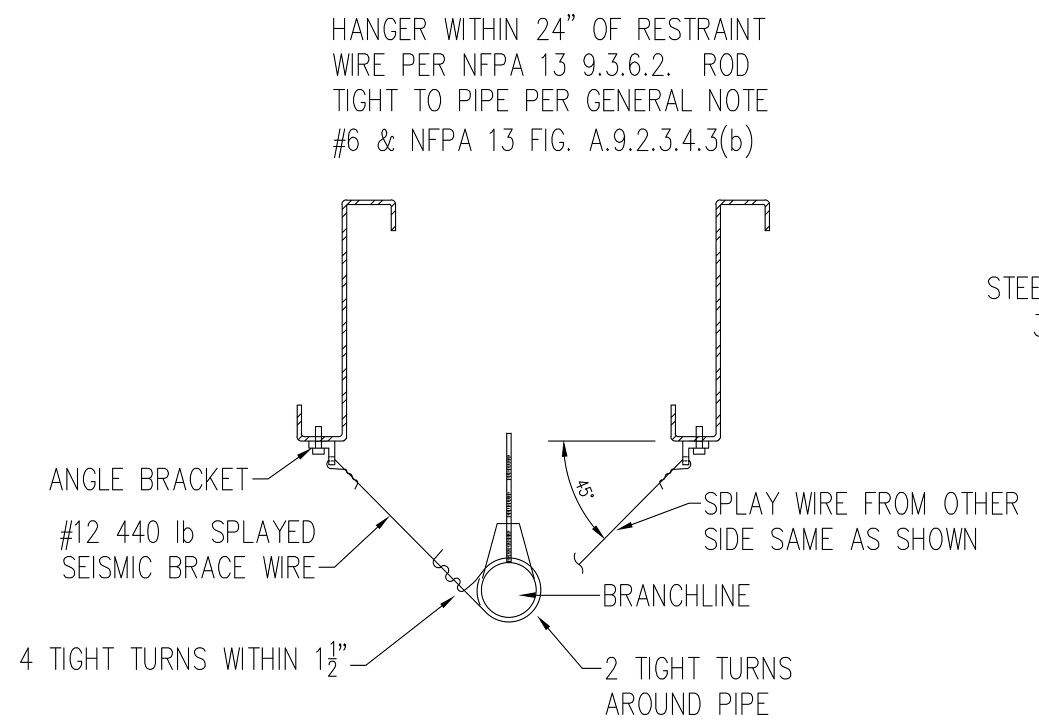
TOPOCK GROUNDWATER REMEDIATION PROJECT

CONSTRUCTION HEAD□UARTERS
FIRE SUPPRESSION YARD PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

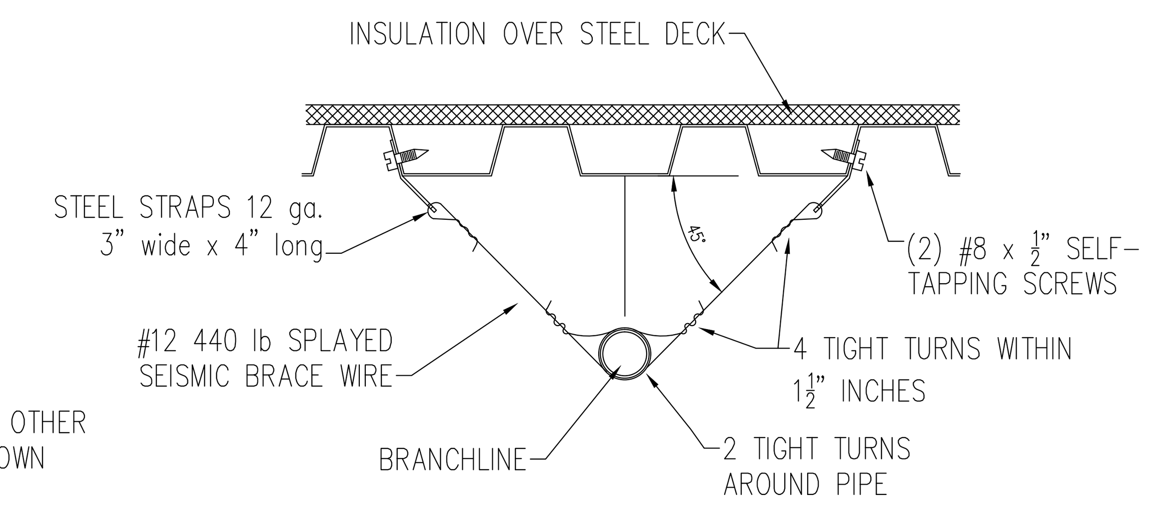
MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
F-15-01	REV 1

N1808



BRANCH LINE RESTRAINT

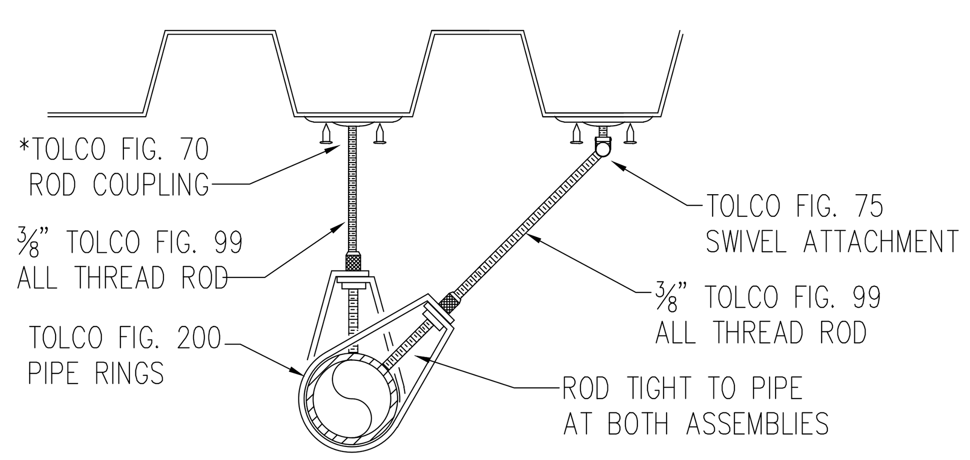
(FOR PIPE HUNG w/ ROD LONGER THAN 6")



BRANCH LINE RESTRAINT

(FOR PIPE HUNG w/ ROD LONGER THAN 6")

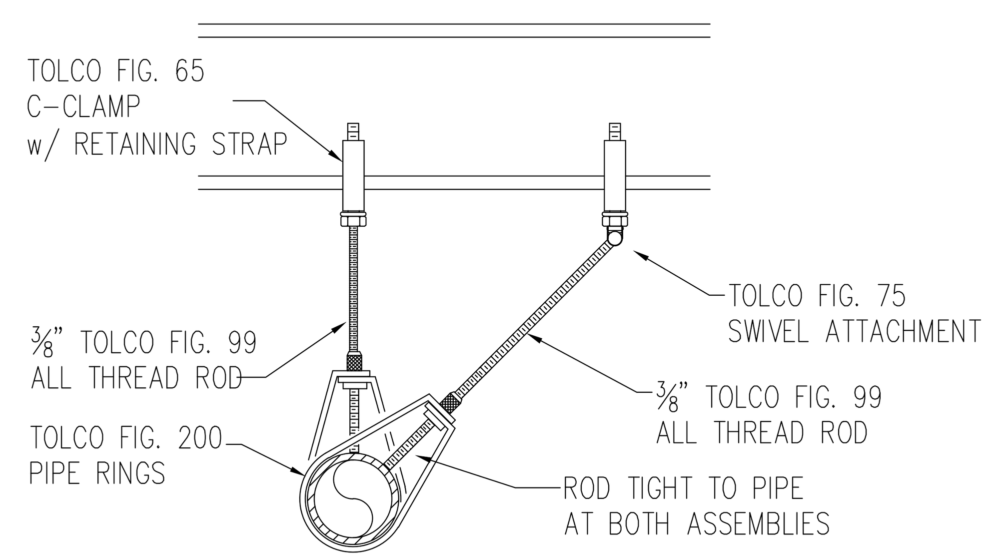
RESTRAINT TO BE INSTALLED WITHIN 24" OF HANGER PER NFPA 13. ROD TO BE RUN DOWN TIGHT TO PIPE PER NFPA 13.



TYPICAL BRANCH LINE RESTRAINT

(FOR PIPE HUNG w/ ROD LONGER THAN 6")

HANGER WITHIN 6" OF RESTRAINT WIRE PER NFPA 13 9.3.6.2. ROD TIGHT TO PIPE PER GENERAL NOTE #6 & NFPA 13 FIG. A.9.2.3.4.3(b)



TYPICAL BRANCH LINE RESTRAINT

(FOR PIPE HUNG w/ ROD LONGER THAN 6")

HANGER WITHIN 6" OF RESTRAINT WIRE PER NFPA 13 9.3.6.2. ROD TIGHT TO PIPE PER GENERAL NOTE #6 & NFPA 13 FIG. A.9.2.3.4.3(b)

BRANCH LINE RESTRAINT NOTES
(FOR PIPE HUNG W/ ROD LONGER THAN 6")

1. BRANCH LINE RESTRAINT SHALL BE PROVIDED BY THE USE OF ONE OF THE FOLLOWING (PER NFPA 13, 2013 ED., SECTION 9.3.6):
   - 1.1. LISTED SWAY BRACE ASSEMBLY (SEE SEISMIC BRACING DETAILS).
   - 1.2. WRAPAROUND U-HOOK SATISFYING THE REQUIREMENTS OF 9.3.5.5.11
   - 1.3. NO. 12, 440 LB WIRE INSTALLED AT LEAST 45° FROM THE VERTICAL PLANE AND ANCHORED ON BOTH SIDES OF THE PIPE. (WIRE RESTRAINT SHALL BE LOCATED WITHIN 24" OF A HANGER WHICH IS OF A TYPE THAT WILL PREVENT UPWARD MOVEMENT PER 9.3.6.2.
   - 1.4. CPVC HANGERS UTILIZING TWO POINTS OF ATTACHMENT.
   - 1.5. HANGER NOT LESS THAN 45° FROM VERTICAL INSTALLED WITHIN 6" OF THE VERTICAL HANGER ARRANGED FOR RESTRAINT AGAINST UPWARD MOVEMENT, PROVIDED IT IS UTILIZED SUCH THAT L/R DOES NOT EXCEED 400, WHERE THE ROD SHALL EXTEND TO THE PIPE OR HAVE A SURGE CLIP INSTALLED. MAX LENGTH OF ⅜" ROD @ L/R OF 400 = 30"
2. THE END SPRINKLER ON A LINE SHALL BE RESTRAINED. PER 9.3.6.3.
3. BRANCH LINES SHALL BE LATERALLY RESTRAINED AT INTERVALS NOT EXCEEDING THOSE SPECIFIED IN TABLE 9.3.6.4(A) BASED ON BRANCH LINE DIAMETER AND THE VALUE OF CP. (PER 9.3.5.9.3, CP = .35)
4. WHERE BRANCH LINES ARE SUPPORTED BY RODS LESS THAN 6" LONG MEASURED BETWEEN THE TOP OF THE PIPE AND THE POINT OF ATTACHMENT TO THE BUILDING STRUCTURE, THE REQUIREMENTS OF 9.3.6.1 THROUGH 9.3.6.4 SHALL NOT APPLY AND ADDITIONAL RESTRAINT SHALL NOT BE REQUIRED. (PER 9.3.6.5.)
5. SPRIGS 4 FT OR LONGER SHALL BE RESTRAINED AGAINST LATERAL MOVEMENT. (9.3.6.6)
6. DROPS AND ARMOVERS SHALL NOT REQUIRE RESTRAINT. (9.3.6.7)

Cp value per NFPA 13 – 2013 table 9.3.5.9.3

Ss		Cp
0.23	=	0.35

SEISMIC COEFFICIENT
ASCE 7 Standard

Latitude = 34.84806   Longitude = –114.614131

Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B – Fa = 1.0 ,Fv = 1.0
Data are based on a 0.01 deg grid spacing

Period (sec)	Sa (g)
0.2	0.226 (Ss, Site Class B)
1.0	0.135 (S1, Site Class B)

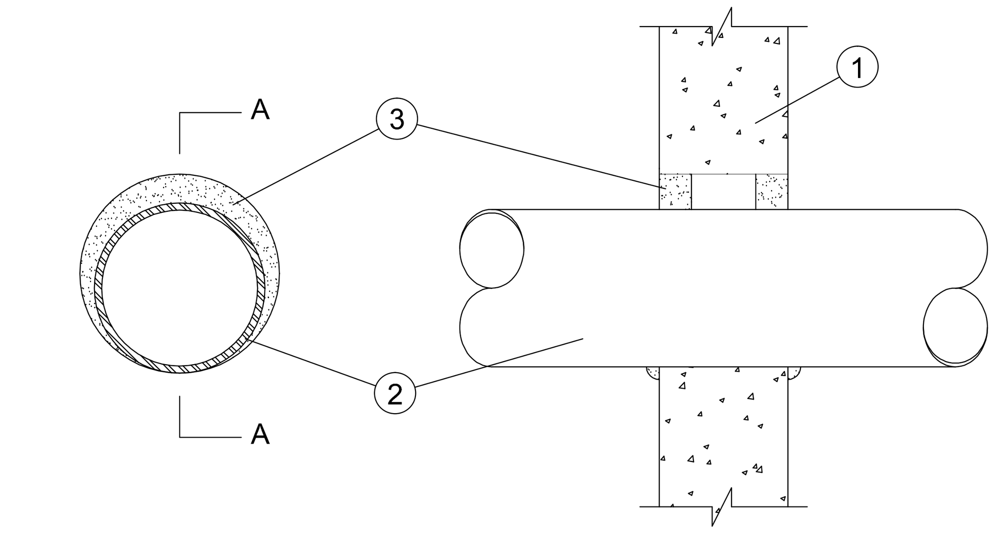
MAX SPACING OF STEEL BRANCHLINE RESTRAINTS PER NFPA Table 9.3.6.4(a)

PIPE (IN.)	SEISMIC COEFFICIENT (Cp) Cp≤0.50	0.5<Cp≤0.71	Cp>0.71
1"	43	36	26
1¼"	46	39	27
1½"	49	41	29
2"	53	45	31

U.L. SYSTEM NO. WJ1067

METAL PIPE THROUGH A SLEEVE IN CONCRETE FLOOR,WALL,OR BLOCK WALL

F RATING = 1 & 2-HR.
T RATING = 0-HR.
L RATING AT AMBIENT = 0 LESS THAN 1 CFM/SQ. FT.
L RATING AT 400° = 4 CFM/SQ. FT.



SECTION A-A

1. WALL ASSEMBLY :
   A. MINIMUM 5" THICK LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE WALL.
   B. U.L. CLASSIFIED CONCRETE BLOCK WALL (MINIMUM 8" BLOCK).
2. PENETRATING ITEM TO BE ONE OF THE FOLLOWING :
   A. MAXIMUM 30" DIAMETER SCHEDULE 10 OR HEAVIER STEEL PIPE.
   B. MAXIMUM 6" NOMINAL DIAMETER COPPER PIPE.
   C. MAXIMUM 6" NOMINAL DIAMETER STEEL CONDUIT.
   D. MAXIMUM 4" NOMINAL DIAMETER EMT.
3. HILTI FS-ONE HIGH PERFORMANCE INTUMESCENT FIRESTOP SEALANT: MIN. 5/8" THICKNESS APPLIED WITHIN ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. AT THE POINT OR CONTINUOUS CONTACT LOCATIONS BETWEEN PIPE AND WALL, A MIN 1/2" DIA BEAD OF FILL MATERIAL SHALL BE APPLIED AT PIPE-WALL INTERFACE ON BOTH SURFACES.

NOTES : 1. MAXIMUM DIAMETER OF OPENING = 32-1/4".
2. "ANNULAR SPACE = MINIMUM 0", MAXIMUM 1-7/8".
3. PIPE TO BE CENTERED WITHIN THE FIRESTOP SYSTEM.

SEE HILTI FIRESTOP INSTALLATION MANUAL FOR ADDITIONAL INSTRUCTIONS
HILTI, INC. TULSA, OK 1-800-879-8000

* PIPES 4" AND LARGER SHALL BE PROVIDED WITH A FLEXIBLE COUPLING WITHIN 12" OF EACH SIDE OF PENETRATION.(NFPA 13)

PENETRATION DETAIL

(NOT TO SCALE)

EARTHQUAKE BRACING NOTES

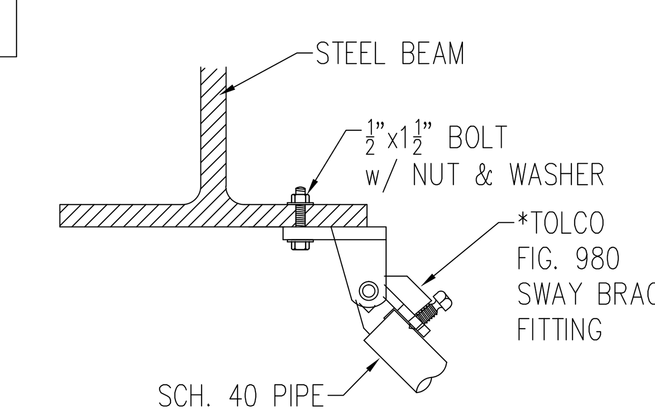
1. EARTHQUAKE BRACING SHALL BE PROVIDED PER NFPA 13, 2013 ed., SECTION 9.3.5.
2. LOADS ARE DETERMINED BY ANALYSIS PER 9.3.5.5.3 (SEE ANNEX E & CALCULATIONS).
3. LONGITUDINAL BRACES SHALL BE ALLOWED TO ACT AS LATERAL BRACES WHERE THEY ARE INSTALLED WITHIN 24" OF PIPING WHICH IS BRACED LATERALLY AND VICE VERSA PER 9.3.5.6.27 & 9.3.5.5.8.
4. EACH RUN OF PIPE BETWEEN A CHANGE IN DIRECTION SHALL BE PROVIDED WITH BOTH LATERAL AND LONGITUDINAL BRACING. EXCEPTION: PIPE RUNS LESS THAN 12 ft. PER 9.3.5.7.2.
5. WHERE THERE IS A CHANGE IN DIRECTION, THE CUMULATIVE DISTANCE BETWEEN LATERAL SWAY BRACES SHALL NOT EXCEED THE MAXIMUM PERMITTED DISTANCE IN ACCORDANCE WITH 9.3.5.5.2.2 (40 FT).

GENERAL NOTES

1. THE AUTOMATIC SPRINKLER SYSTEM SHALL CONFORM TO THE REQUIREMENTS OF THE 2013 EDITION OF NFPA 13.
2. PENETRATIONS OF RATED ASSEMBLIES SHALL BE FIRE STOPPED. (SEE DETAIL)
3. ALL ELECTRICAL WIRING TO BE PERFORMED BY OTHERS.
4. ARMOVERS LONGER THAN 24" SHALL BE PROVIDED WITH A HANGER.
5. THE NEW SYSTEM IS HYDRAULICALLY CALCULATED. (SEE PIPING PLAN)
6. NEW PIPING SHALL BE SUPPLIED FROM NEW UNDERGROUND.
7. UPON COMPLETION, THE OVERHEAD SYSTEM SHALL BE TESTED AT 200 PSI FOR TWO (2) HOURS. (BEFORE TIE-IN)
8. BUILDING CONSTRUCTION IS OF NON-COMBUSTIBLE CONSTRUCTION.
9. OWNER:
10. FOR INSPECTION CALL:
11. EXCLUSIONS (WORK BY OTHERS):
    1. Installation of Systems.
    2. Wiring of Fire Alarm Systems.
    3. All Underground Fire Line and Hydrant Design (By Civil).
    4. Structural Calculations.
    5. Plan Review, Permit and Water Dept. Flow Fees

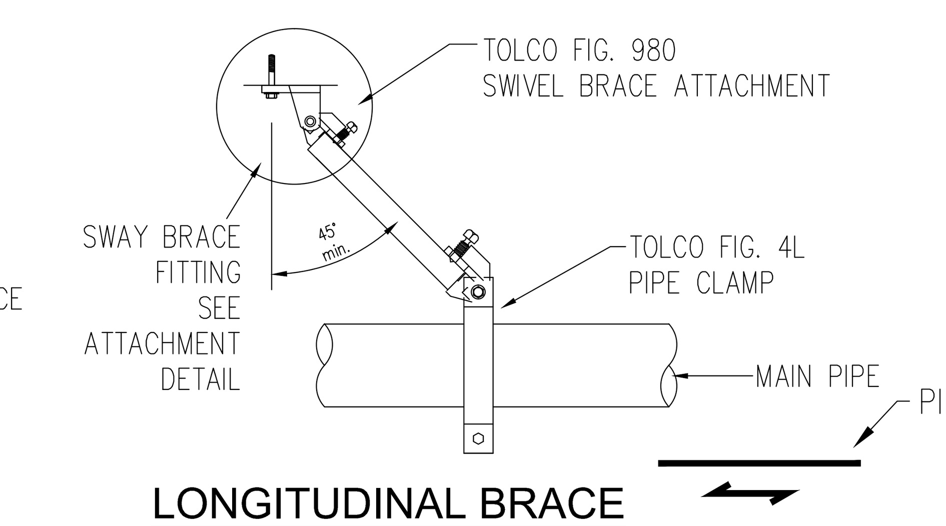
LEGEND

- 2-WAY EARTHQUAKE BRACE
- 4-WAY EARTHQUAKE BRACE
- FLEX – FLEXIBLE GROOVED COUPLING
- RIGID "O-FLEX" GRV'D COUPLING
- GROOVED CAP
- #4 – HANGER No.
- APPROX. HANGER LOCATION
- XX – HYDRAULIC REFERENCE NODE
- SYSTEM RISER
- PIPE ELEVATION
- +10'0" – CEILING HEIGHT
- ℄ – CENTER LINE
- AFF – ABOVE FINISH FLOOR
- UNO – UNLESS NOTED OTHERWISE
- BOB – BOTTOM OF BEAM
- BOD – BOTTOM OF DECK
- BOF – BOTTOM OF FRAMING
- COJ – CUT ON JOB
- TOE – THREAD ONE END
- GOE – GROOVE ONE END
- GxG – GROOVE x GROOVE
- TxG – THREAD x GROOVE
- FxG – FLANGE x GROOVE
- TOR – TOP OF RISER
- BOR – BOTTOM OF RISER
- MC – MALLEABLE COUPLING
- UG – UNDERGROUND
- OH – OVERHEAD
- RN – RISER NIPPLE
- SU – SPRIG UP
- DR – DROP TO SPRINKLER
- (E) – EXISTING
- (N) – NEW
- (R) – RELOCATE

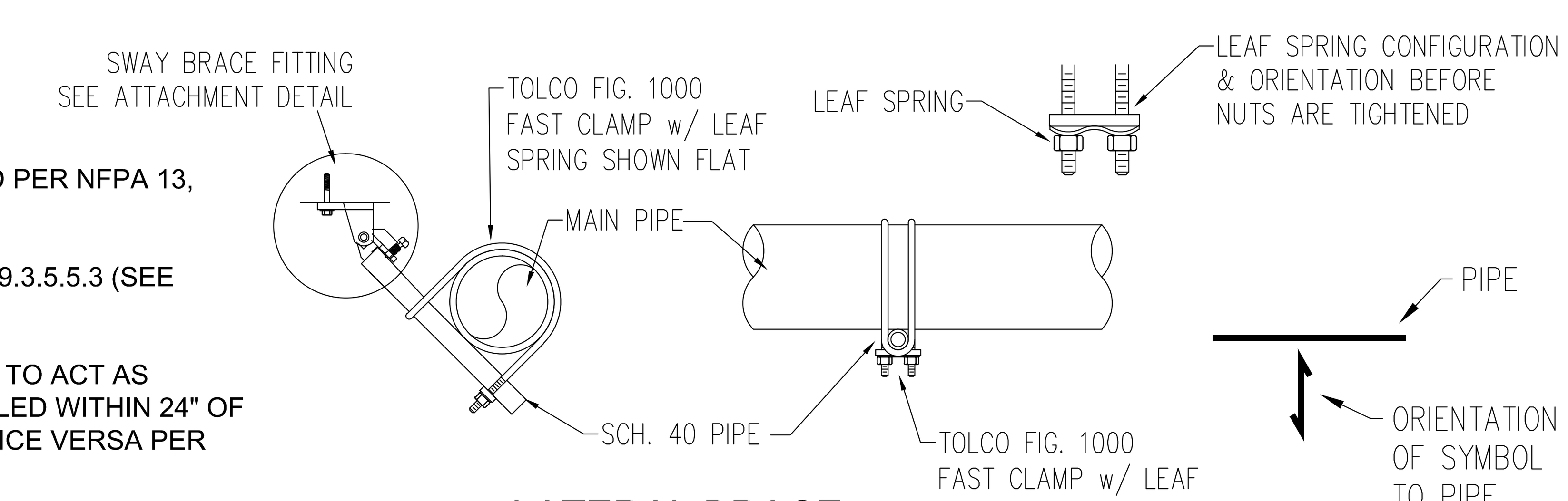


DETAIL S1

*PARALLEL OR PERPENDICULAR TO BEAM



LONGITUDINAL BRACE



LATERAL BRACE

SEISMIC BRACING

NO SCALE

- DRAFT -
NOT FOR CONSTRUCTION

MARQUEE
FIRE PROTECTION
710 W. [illegible]
[illegible], CA. 95834-1130
TEL. 916. 641-7997 / 707. 642-7905
FAX. 916. 641-0775
CA. LIC. 570970 C-16

ARCADIS

REVISIONS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	JMS	JPB	JEF
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	JMS	JPB	JEF

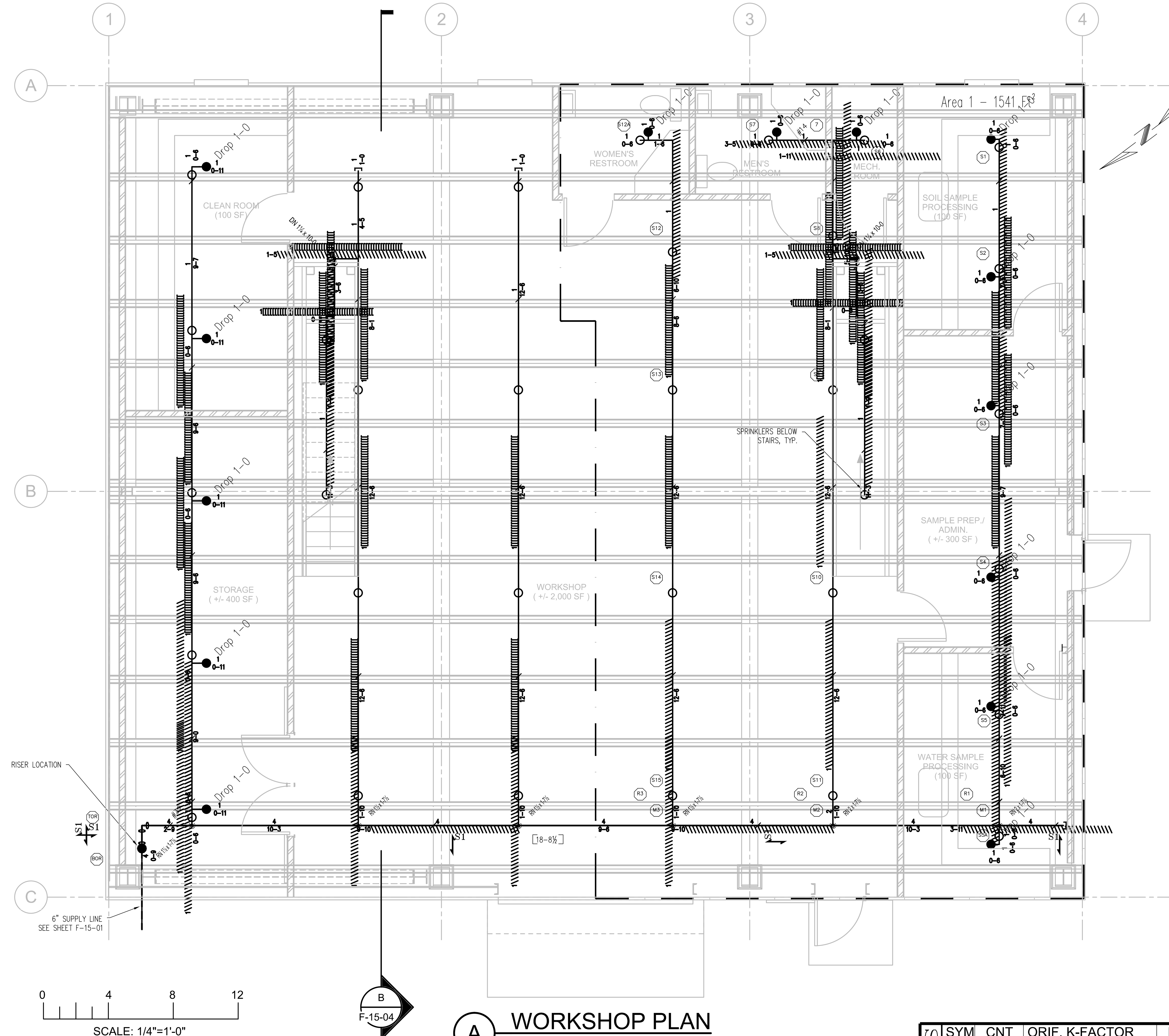
APPROVED BY: JEF

SO	
SUPV	JPB
DSGN	JMS
DWN	AJW
CHKD	JPB
OK	JEF
DATE	2/2/15
SCALES	1" = 20'

TOPOCK GROUNDWATER REMEDIATION PROJECT
WORKSHOP FIRE PROTECTION
GENERAL NOTES
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
F-15-02
REV 1

N1808

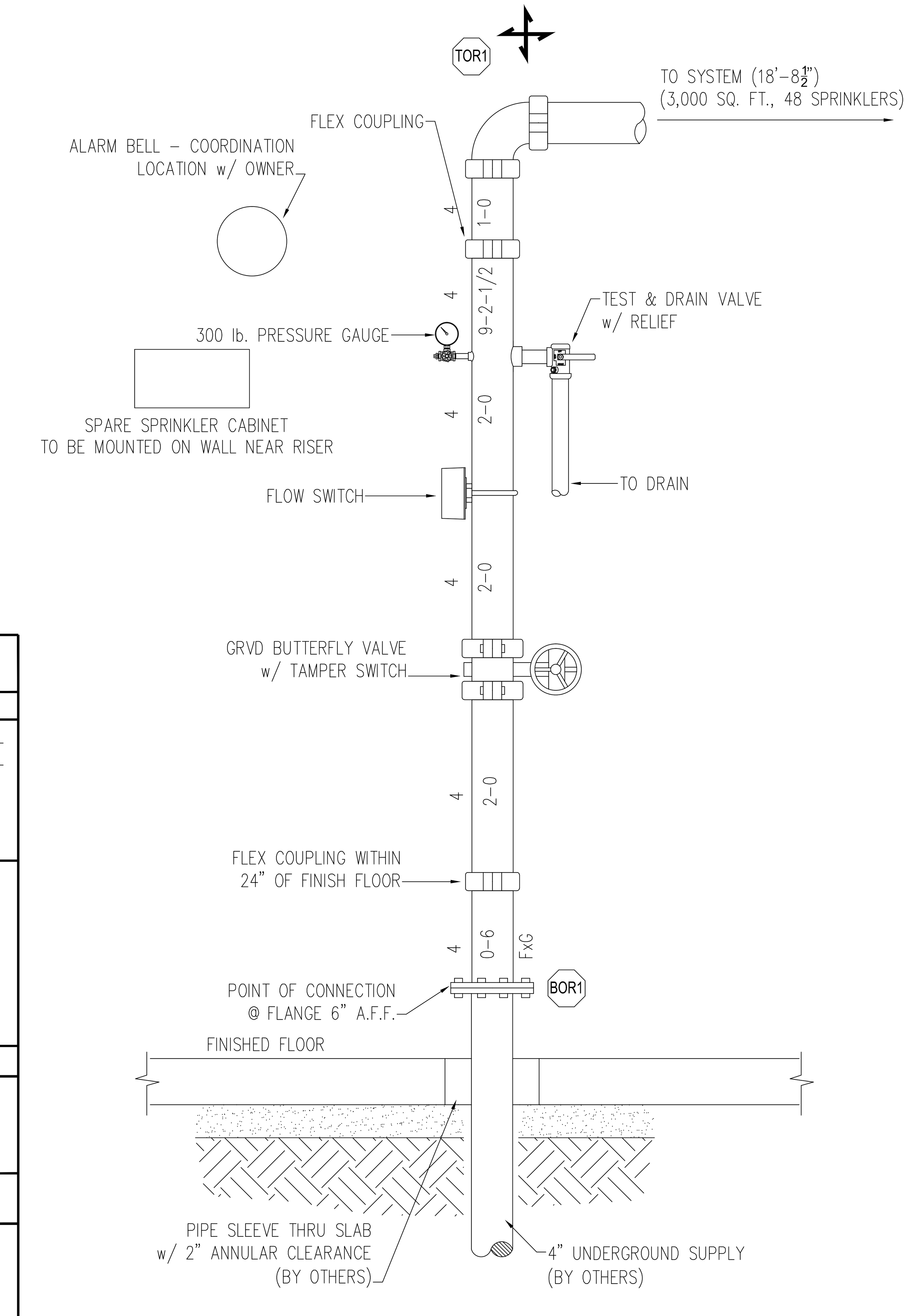


SCALE: 1/4"=1'-0"

B F-15-04

A WORKSHOP PLAN

1/4" = 1'-0"



FIRE SPRINKLER RISER DETAIL

NO SCALE

CALCULATION DESIGN INFORMATION

SYSTEM or AREA No.	ONE
QUICK RESPONSE SPRINKLERS?	YES
SYSTEM TYPE	WET
K-FACTOR	8.0
HAZARD	ORD. GP. 2
DENSITY (GPM/FT²)	.20
AREA PER SPRINKLER (FT²)	128
AREA OF OPERATION (FT²)	1500
AREA OF OPERATION ADJUSTED AS FOLLOWS:	
DRY PIPE INCREASE (30%)	N/A
SLOPE >2:12 INCREASE (30%)	N/A
CEILING HEIGHT:	N/A
% REDUCTION:	N/A
CEILING HEIGHT REDUCTION (FT²)	N/A
ADJ. AREA OF OPERATION (FT²)	1500
WATER SUPPLY	
STATIC (PSI)	N/A
RESIDUAL (PSI)	N/A
FLOW (GPM)	N/A
PUMP (GPM @ PSI)	N/A @ N/A
SYSTEM DEMAND REQUIRED AT: BASE OF RISER	
PSI REQUIRED	43.372
GPM REQUIRED	499.353
PSI AVAILABLE	N/A
GPM AVAILABLE	N/A
SAFETY MARGIN	N/A
HOSE STREAM DEMAND (GPM): INSIDE:	N/A
OUTSIDE:	250
LOCATION:	WORKSHOP

SPRINKLERS

SYM	CNT	ORIF, K-FACTOR	NPT	MFG.	TEMP	FINISH	RESPONSE-STYLE	S.I.N.	MODEL#	ESCUTCHEON
○	34	(17/32",K=8.0)	3/4"	VKG	200	BRASS	SR - SSU	VK200	MMATIC	N/A
◉	14	(17/32",K=8.0)	3/4"	VKG	155	CHRM	SR - SSP	VK202	MMATIC	WHT E-1 RECESSED

48 = TOTAL SPRINKLERS THIS SHEET

PIPING PLAN

1. AT OBSTRUCTED CONSTRUCTION SPRINKLER DEFLECTOR SHALL NOT EXCEED 6" BELOW THE BOTTOM OF THE FRAMING. (DEFLECTOR SHALL NOT EXCEED 22" BELOW THE DECK.)
2. MAIN PIPING SHALL HANG AT 18'-8½" AFF. LINE PIPING SHALL HANG AT 6" BOTTOM OF FRAMING.
3. MAIN HANGERS SHALL BE (#7) C-CLAMP W/ RETAINER STRAP. LINE HANGERS SHALL BE (#4) SIDE BEAM BRACKET. (SEE DETAILS)
4. MAIN PIPING SHALL BE SCHEDULE 10 STEEL (THINWALL) AND SHALL BE ROLL GROOVED PER NFPA 13. LINE PIPING SHALL BE SCHEDULE 40 STEEL (STANDARD) AND SHALL BE GROOVED OR THREADED PER NFPA.

- DRAFT -
NOT FOR CONSTRUCTION

MARQUEE
FIRE PROTECTION
710 W. S[illegible] CA. 95834-1130
TEL. 916. 641-7997 / 707. 642-7905
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CA. LIC. 570970 C-16

ARCADIS

REVISIONS

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APPROVED BY: JEF
SO
SUPV: JPB
DSGN: JMS
DWN: AJW
CHKD: JPB
OK: JEF
DATE: 2/2/15
SCALES: AS NOTED

TOPOCK GROUNDWATER REMEDIATION PROJECT
WORKSHOP FIRE PROTECTION PIPING PLAN
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
F-15-03
REV 1

HANGER NOTES

1. ALL HANGER ASSEMBLIES ARE PER NFPA 13 & MANUFACTURER DETAILS.

2. PER CBC AND NFPA 13 THE BUILDING STRUCTURE MUST BE CAPABLE OF SUPPORTING THE ADD LOAD OF THE WATER FILLED PIPE PLUS A MINIMUM OF 250 LBS.

3. HANGER SPACING SHALL BE PER NFPA 13 TABLE 9.2.2.1(A).

9.2.4 LOCATION OF HANGERS ON MAINS

9.2.4.1 UNLESS THE REQUIREMENTS OF 9.2.4.2, 9.2.4.3, 9.2.4.4, 9.2.4.5 OR 9.2.4.6 ARE MET, HANGERS FOR MAINS SHALL BE IN ACCORDANCE WITH 9.2.2, BETWEEN EACH BRANCH LINE OR ON EACH SECTION OF PIPE, WHICHEVER IS THE LESSER DIMENSION.

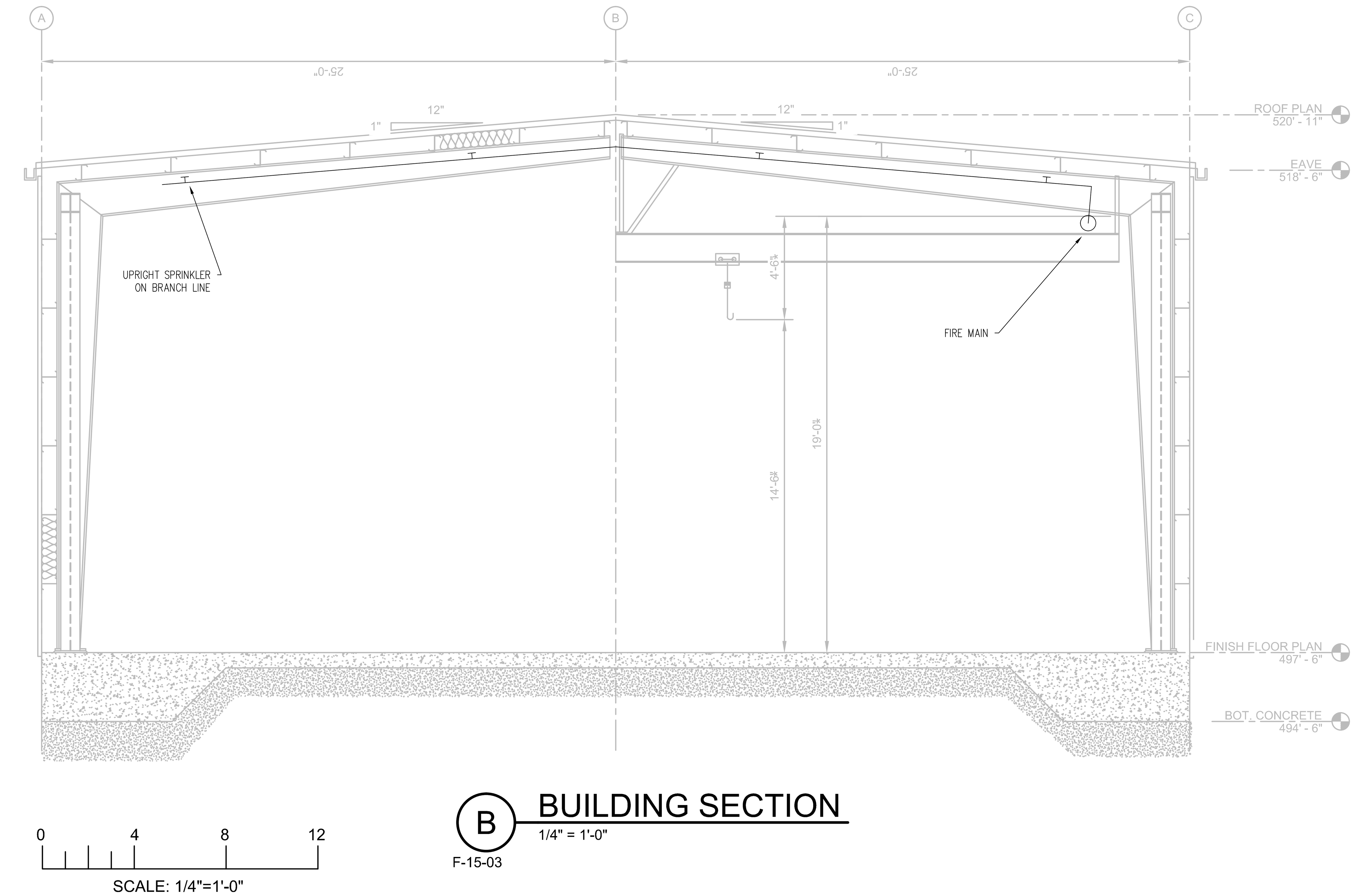
9.2.4.2: FOR WELDED OR MECHANICAL OUTLETS ON A CONTINUOUS SECTION OF PIPE, HANGER SPACING SHALL BE ACCORDING TO TABLE 9.2.2.1(A).

9.2.4.3: FOR CROSS MAINS IN STEEL PIPE SYSTEMS IN BAYS HAVING TWO BRANCH LINES, THE INTERMEDIATE HANGER SHALL BE PERMITTED TO BE OMITTED PROVIDED THAT A HANGER ATTACHED TO A PURLIN IS INSTALLED ON EACH BRANCH LINE LOCATED AS NEAR TO THE CROSS MAIN AS THE LOCATION OF THE PURLIN PERMITS. REMAINING BRANCH LINE HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH 9.2.3.

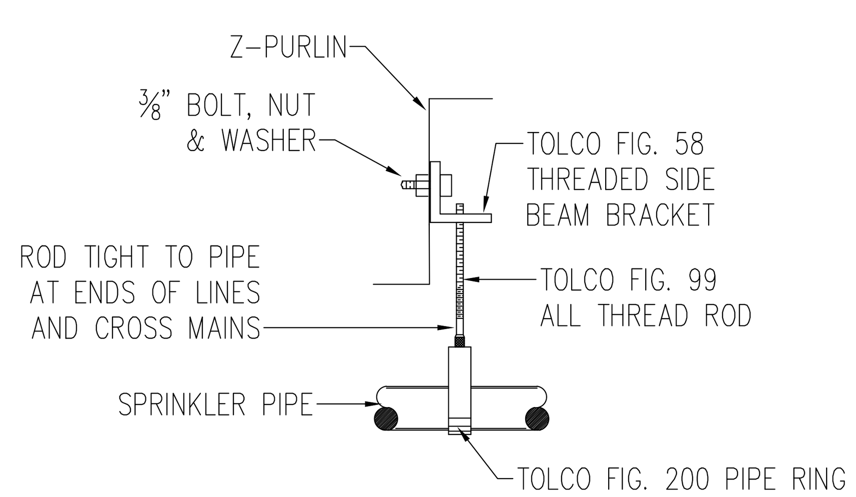
9.2.4.7: A SINGLE SECTION OF PIPE SHALL NOT REQUIRE A HANGER WHEN THE CUMULATIVE DISTANCE BETWEEN HANGERS ON THE MAIN DOES NOT EXCEED THE SPACING REQUIRED BY TABLE 9.2.2.1(A).

HANGER SPACING TABLE PER NFPA Table 9.2.2.1(a)

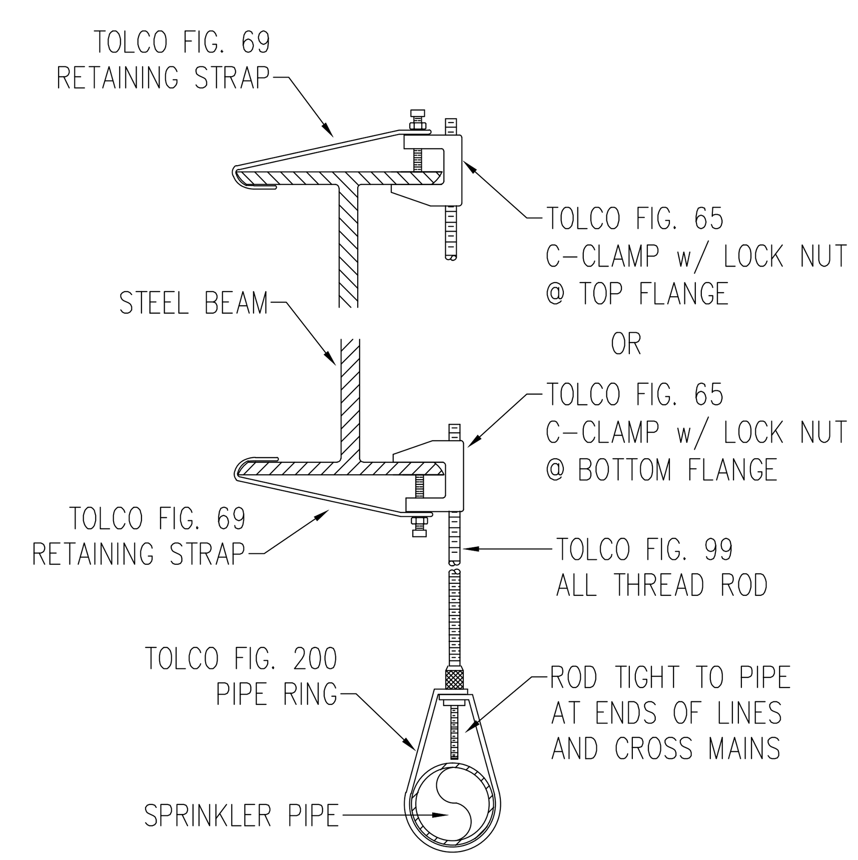
Nominal Pipe Size (in.)	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"
Steel Pipe	12'-0"	12'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"	15'-0"



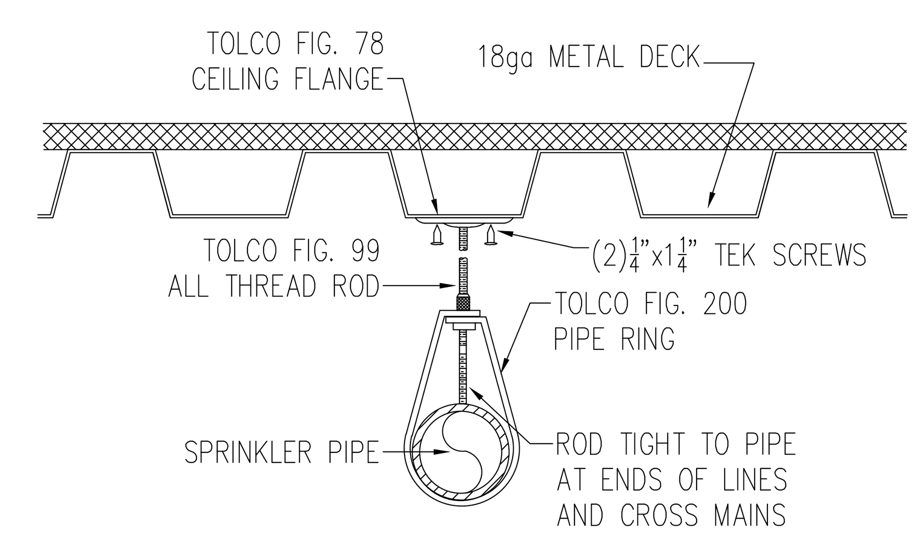
B BUILDING SECTION
1/4" = 1'-0"
F-15-03



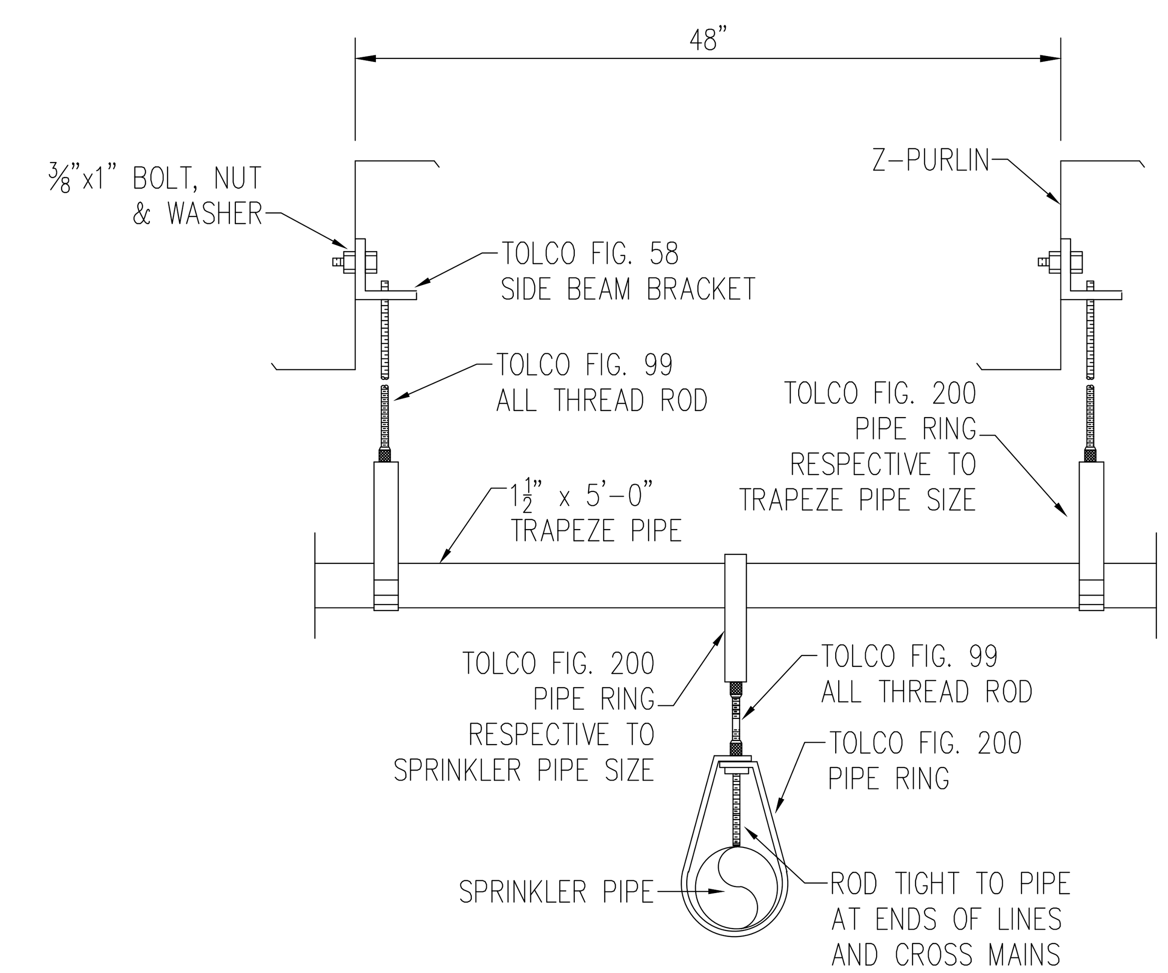
SIDE BEAM BRACKET #4
NO SCALE



C-CLAMP HANGER #7
NO SCALE



CEILING FLANGE HANGER #14
NO SCALE



PIPE TRAPEZE HANGER #32
NO SCALE

- DRAFT -
NOT FOR
CONSTRUCTION

MARQUEE
FIRE PROTECTION
710 W. S[illegible] L[illegible]
S[illegible], CA. 95834-1130
TEL. 916. 641-7997 / 707. 642-7905
FAX. 916. 641-0775
CA. LIC. 570970 C-16

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	JMS	JPB	JEF
0	2/2/15	SUPPLEMENTAL PRE-FINAL (90%) DESIGN		AJW	JMS	JPB	JEF

REVISIONS

APPROVED BY: JEF
SO
SUPV JPB
DSGN JMS
DWN AJW
CHKD JPB
OK JEF
DATE 2/2/15
SCALES AS NOTED

TOPOCK GROUNDWATER REMEDIATION PROJECT
WORKSHOP FIRE PROTECTION
DETAILS
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
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SHEET NO. of SHEETS
F-15-04
REV 1

H1808

Assessment of Biological Resources for the Proposed Sewer and Fire Water Lines for the Construction Headquarters: Final Groundwater Remedy,Topock Compressor Station, California

PREPARED FOR:	Virginia Strohl/PG&E
PREPARED BY:	Russell Huddleston/CH2M HILL
COPIES:	Curt Russell /PG&E Marjorie Eisert/CH2M HILL
DATE:	August 3, 2015

Introduction

This technical memorandum provides a general assessment of biological resources that could be affected by the proposed sewer and fire water lines that may be installed in the future and are associated with the construction headquarters (CHQ) facilities that would be located to the west of Park Moabi, south of the National Trails Highway.

The CHQ and associated infrastructure would be located entirely on federal lands managed by the Bureau of Land Management that are currently leased to San Bernardino County. Therefore, no additional impacts would occur to the Havasu National Wildlife Refuge lands.

Site Description

The CHQ will be located in an area that was recently (early 2013) cleared and graded for a paint ball game sponsored by Park Moabi. Initially, connections from the CHQ to the County sewer line and fire water services will not be constructed. However, sewer and fire water pipelines may be added in the future should connections to the County facilities become available. There are currently two alternatives being considered for the potential sewer and fire water pipeline alignment. For alternative 1, the sewer and fire water pipeline would extend to the west-southwest for approximately 250 feet, in roughly the same alignment as the potable water and power distribution lines. The pipelines would then turn to the northwest and continue approximately 250 feet to the north side of the National Trails Highway. Under this alternative, the alignment would cross a wash within the existing dirt roadway (that would be improved as part of the CHQ). From the north side of the road, the alignment would then continue approximately 1,750 feet along the north shoulder of the National Trails Highway where it would tie into existing pipelines in the developed part of Park Moabi (Figure 1).Under alternative 2, sewer and fire water pipelines would extend approximately 250 feet northwest from the CHQ, crossing a wash feature and continue to the north side of the National Trails Highway. The alignment would then make a 90 degree turn to the northeast and continue approximately 1,400 feet along the north shoulder of the National Trails Highway where it would tie into existing pipelines in the developed part of Park Moabi (Figure 1).

The following sections discuss potential biological issues associated with the proposed potential alignments for the sewer and fire water pipeline alternatives.

Wildlife

Both alternatives are largely located in disturbed areas that provide low quality habitat for wildlife species. No desert tortoise or sign (e.g., burrows, scat, remains) has been found in this area. A number of special-status bird species including bank swallow (*Riparia riparia*), Bell's vireo (*Vireo belli*), southwest willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus*), and Yuma clapper rail

(*Rallus longirostris yumanensis*) have been observed in the EIR project area. However, suitable habitat for these species including riparian, emergent wetland, woodlands, and dense shrubby areas are not present along either alternative.

Vegetation

Both alternatives are located in disturbed areas with sparse vegetation. The few large trees and shrubs that are important from both a visual aesthetic viewpoint as well as culturally significant species present in the vicinity of the proposed alignment are spaced widely enough apart that significant impacts to vegetation can be avoided.

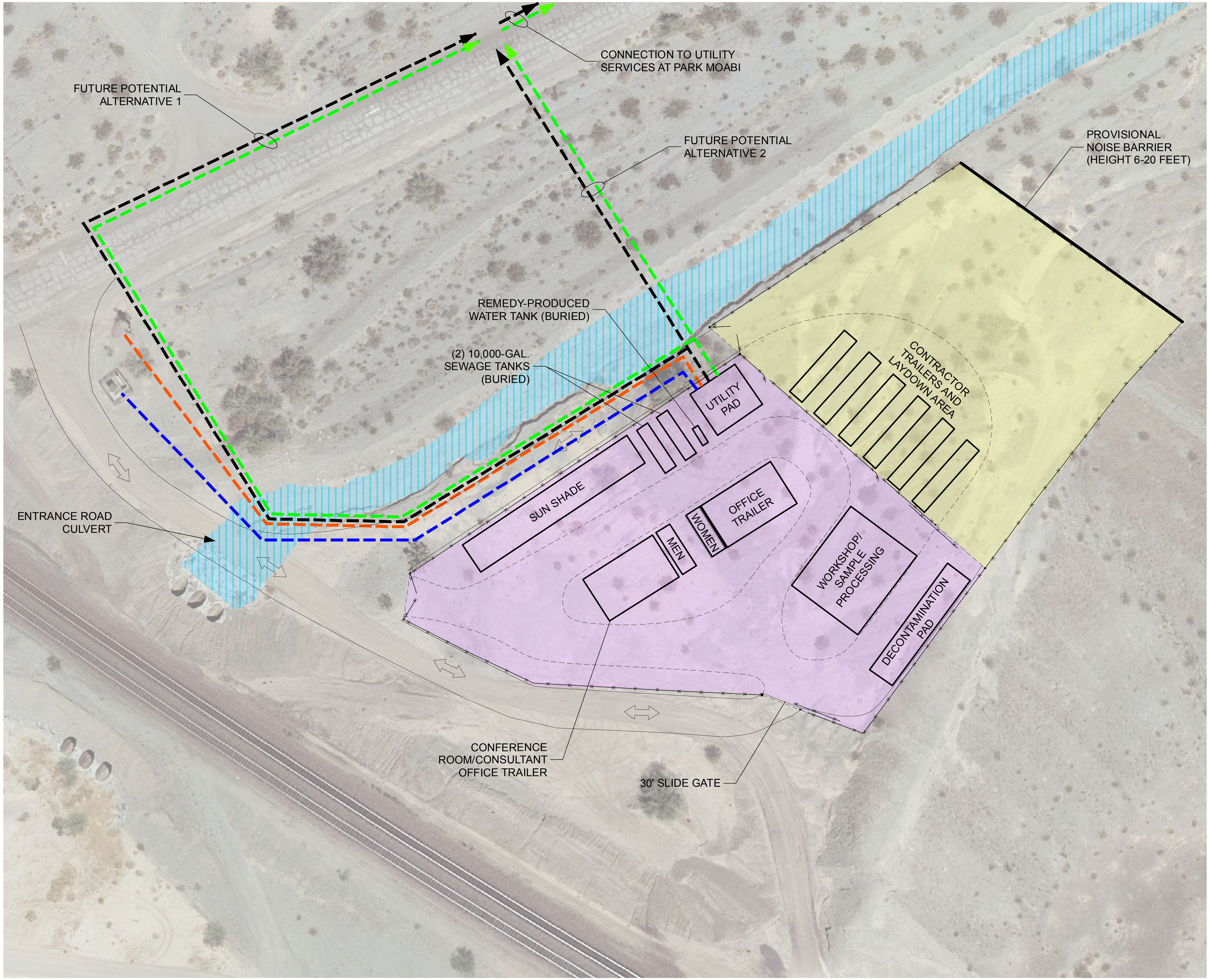
Wetlands and Waters

Both alternatives would cross the wash located on the northern side of the CHQ (Figure 1). The wash has been delineated as a Riverine Intermittent Stream Bed Cobble-Gravel Temporarily Flooded wetland (CH2M HILL 2014). The wash eventually flows into the Park Moabi Slough, and ultimately into the Colorado River. The wash is therefore tributary to a Traditional Navigable Water and is considered to be a jurisdictional Waters of the United States under Section 404 of the Clean Water Act. The wash would also be regulated as a stream under Section 1600 of the California Fish and Game Code. In this area, the wash originates at three 8.5-foot-diameter corrugated metal pipe culverts installed under the Burlington Northern Santa Fe railroad tracks. An existing dirt access road is located just east of the culvert outfall and west of the clearly defined wash channel. The access road is currently in functioning condition, but would be upgraded to maintain flows while allowing access to the CHQ. East of the existing road, the wash is characterized by a relatively uniform bed with steep side slopes. The substrate consists of coarse sand with scattered pebbles and cobbles and boulders. Vegetation within the channel includes several small blue palo verde saplings along the edges with scattered creosote bush, brittlebush (*Encelia farinosa*), honeysweet (*Tidestromia oblongifolia*), small-seeded spurge (*Chamaesyce polycarpa*), and Spanish needle (*Palafoxia arida*) within and along the channel.

Under alternative 1, the excavation for the sewer and fire water pipelines would occur in the area where the existing road and proposed upgrades as well as additional utilities lines would be located (Figure 1). Installation of the pipelines in this location would, therefore, not result in additional temporary impacts to the wash.

Under alternative 2, the proposed alignment for the sewer and fire water pipelines would be buried under the open channel northwest from the proposed CHQ. Impacts associated with this alternative are dependent on construction methods. If the pipe were to be installed in an approximately 5-foot-wide open cut trench across the approximately 40-foot wide channel, approximately 200 square feet of temporary impacts would occur. To the maximum extent possible impacts to perennial vegetation would be avoided and minimized. Following construction, the trench would be backfilled and the channel bed would be restored to the original grade. Alternatively the pipelines could be installed using trenchless methods (e.g. horizontal directional drilling) under the wash, thereby avoiding any temporary impacts to the channel.

All work activities within the wash will be conducted in conformance with the Avoidance and Minimization Measures specified by the California Department of Fish and Wildlife for the project and best management practices for work in jurisdictional wetlands and waters of the U.S. All work also will comply with other applicable federal and state requirements, including applicable measures in the Mitigation Monitoring and Reporting Program (MMRP) for the Topock Compressor Station Groundwater Remediation Project.



Legend

- Fenceline
- Provisional Noise Barrier (height 6-20 feet)
- Future Potential Fire Water Connections
- Future Potential Sanitary Sewer Connections
- Future Potential Water Connection
- Anticipated Electrical and Telecom Connection*
- Temporary Construction Laydown Area (1.05 acres approx.)
- Long Term Remedy Support Area (0.8 acres approx.)
- Jurisdictional Waterway

Notes:

1. All remedy structure locations are approximate.
2. Descriptions of activities/functions anticipated for the construction support areas are included in the Construction/Remedial Action Work Plan.
3. Descriptions of activities/functions anticipated for the long-term remedy support areas are included in Section 3.5 of the BOD and the O&M Manual.
4. Temporary storage/conex boxes (not shown) may be used within the fenced Construction Headquarters.

* Final locations will be determined by Needles

N

0 60 120 180

1 " = 60 '

PACIFIC GAS AND ELECTRIC COMPANY
TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA
90% RESPONSE TO COMMENTS

DETAILED LAYOUT OF THE CONSTRUCTION HEADQUARTERS AND LONG-TERM REMEDY SUPPORT AREA – MOABI REGIONAL PARK

ARCADIS

FIGURE
1

Attachment R: RTC #815

Revised Figures ES-4C (same as Figure 3.4-1 of the 90% BOD, Exhibit 2.7-1 of O&M Manual Volume 1, and Figure 3.1-4 of the C/RAWP)

LEGEND

Underground Gas Supply Pipe

Proposed Remedy Structure

Notes:

1. All remedy structure locations are approximate.

N

0 100 200 400 Feet

FIGURE ES-4C
GENERAL REMEDY SYSTEM LAYOUT -
TCS EVAPORATION PONDS
SUPPLEMENTAL PRE-FINAL (90%) DESIGN SUBMITTAL FOR THE FINAL GROUNDWATER REMEDY
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

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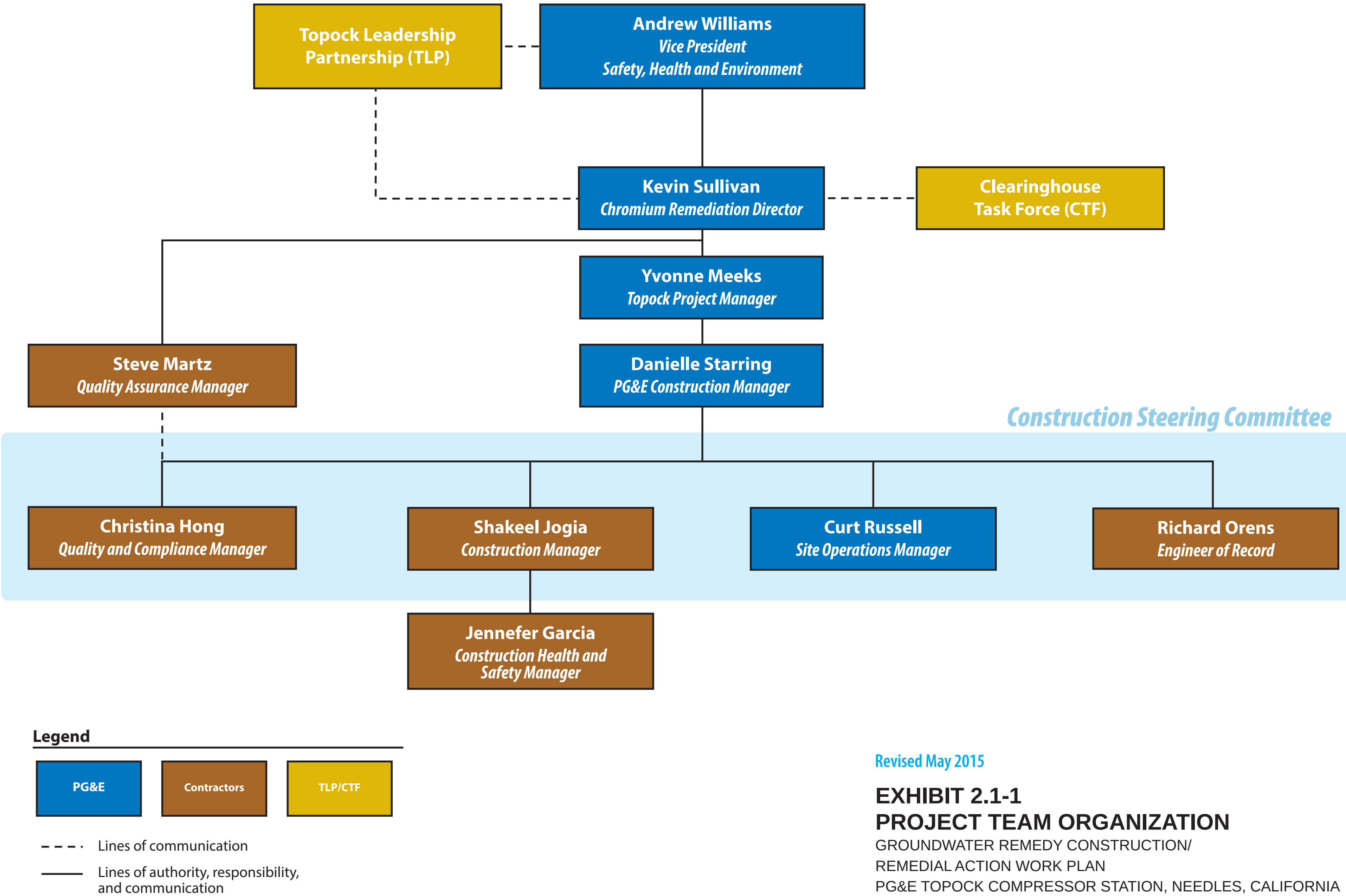
Attachment S: RTC #867

Revised Exhibit 2.1-1 of the C/RAWP



Revised May 2015

EXHIBIT 2.1-1
PROJECT TEAM ORGANIZATION

GROUNDWATER REMEDY CONSTRUCTION/
REMEDIAL ACTION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL

Attachment T: RTC #932

New Exhibit in C/RAWP Section 3.2.1.2 Defining which Boreholes will be used for Groundwater Sampling during Drilling

Exhibit 3.2-2
Preliminary List of Well Locations for Borehole Groundwater Sample Collection
Groundwater Remedy Construction/Remedial Action Work Plan, PG&E Topock Compressor Station, Needles, California

Category 1 (All Locations)	**Category 2 (All Locations)**	**Category 3 (Key Pilot Boreholes)**
MW-A	MW-I	IRZ-1
MW-P	MW-J	IRZ-5
MW-S	MW-O	IRZ-9
MW-Z	MW-Q	IRZ-13
MW-BB	MW-R	IRZ-15
MW-DD	MW-T	IRZ-20
MW-FF	~~MW-U~~	IRZ-27
MW-10D	MW-V	IRZ-35
MW-11D	MW-W	
MW-70BR-D	MW-X	
MW-U	MW-AA	
	MW-CC	
	MW-GG	
	MW-HH	
	MW-II	
	RB-1	
	RB-2	
	RB-3	
	RB-4	
	RB-5	
	MW-H	
	MW-L	
	MW-M	
	MW-N	
	MW-Y	

Notes:

1 - This preliminary list of well locations for borehole groundwater sample collection is subject to change based on observations in the field, and could result in more or less boreholes being utilized for sample collection.

2 - Typically, only one borehole at a given well location (the deepest) will be utilized for borehole groundwater sample collection.

Attachment U: RTC #938

New C/RAWP Section 3.2.1.6, Baseline Well Sampling

3.2.1.6 Baseline Well Sampling

In response to 90% RTC #938 DTSC-167, this section details the plans and methods to collect initial baseline samples from all new extraction, injection, and monitoring wells[1] constructed as part of the groundwater remedy. As new wells are constructed and developed they will be added to baseline well sampling events that will be conducted on a regular frequency (i.e., initiated every 4-6 weeks) during construction. As many new wells as possible will be grouped in each event for efficiency with sampling and laboratory analysis. Baseline groundwater samples will be collected a minimum of 72 hours after well development is completed, thereby allowing the well to stabilize following the extended purge during development, before sample collection in accordance with the SOPs presented in the subsections below.

Baseline monitoring will include two samples collected to establish the baseline conditions; a third baseline sample will be collected if it is necessary to confirm the baseline condition should data from one of the first two events appear anomalous. The two baseline samples will be collected approximately one month apart; however, the time between samples might be shortened if determined necessary to ensure that the collection of these samples does not delay startup of the system. In addition to baseline sample collection at new wells, existing wells will be added to these events as determined necessary. For example, select Category 1 wells will be included in these events beyond the collection of initial baseline samples as determined necessary to inform the location and design of other remedy wells.

Groundwater Sample Collection Methods and Procedures. Sampling and field measurements will be performed in accordance with the SOPs presented in Appendix B. Required sample containers, preservation requirements, sample storage, and QC methods and requirements are described in further detail in the PG&E Program QAPP and QAPP Addendum (see Appendix C).

In continued efforts to integrate sustainability practices into remedial implementation (see Section 4 of the 90% BOD Report), trials of alternative sampling and data collection methods were conducted at Topock to further reduce the overall sampling and project footprint and minimize potential impacts to sensitive resources (e.g., reduce trips to well sites, reduce purge water generation and management, reduce time spent at well sites, etc.).

The trial began in third quarter 2012 (September) and continued through first quarter 2013; it involved testing of two alternative sampling approaches at 18 site wells: the no-purge HydraSleeveTM sampling system and the minimal drawdown (low flow purging) sampling technique. Additional information about these two approaches can be found in numerous publications and public websites including but not limited to the following:

- HydraSleeveTM sampling system (www.hydrasleeve.com): A joint study completed by the U.S. Army Corps of Engineers, the Air Force Center for Environmental Excellence and the Air Force Real Property Agency in 2005 (Parsons 2005)
- Minimal drawdown (low flow purging or micro-purge) sampling technique: USEPA guidance on sampling procedures including the Groundwater Issue Paper: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (Puls and Barcelona 1996) and the Groundwater Sampling Guidelines for Superfund and RCRA Project Managers (USEPA 2002)

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[1] Sampling of existing monitoring wells to document baseline site conditions prior to remedy implementation are discussed in the Basis of Design Report, Section 2 (Baseline Site Conditions and Pre-Design Work).

Trial results were compared to the current standard three-volume purge technique, and evaluated for use in monitoring of the final groundwater remedy. The 2013 Annual Groundwater Monitoring Report (CH2M HILL 2014a; available on the project website at http://dtsc-topock.com/) presented the trial results (see Recommendations section and Appendix H) along with detailed correlations between the two alternative sampling methods and the current three-volume purge method.

Based on the trial results, PG&E recommended to DTSC the use of micro-purge as the default sampling method for the existing groundwater monitoring and compliance monitoring programs. While micro-purge was recommended for groundwater/compliance monitoring, HydraSleeve and other grab sampling methods are also seen as useful tools for process monitoring during remedy implementation. DTSC completed review of PG&E's recommendations on June 26, 2014, and approved the use of micro-purge techniques for wells with screen length of up to 20-foot saturated thickness in alluvial and fluvial sediments (upland and floodplain locations) (DTSC 2014). Implementation of the micro-purge technique at approved wells commenced in the third quarter of 2014. SOPs associated with these alternative techniques have been included in Appendix A.

Additional trials using alternative sampling techniques will be conducted at monitoring wells with 30- to 50-foot screen lengths, and at bedrock open borehole wells located in TCS or the East Ravine. Trial results have been and will continue to be evaluated and new information incorporated into the sampling and monitoring for the final remedy, as appropriate. Additional SOPs may be developed and added to the lists below, or existing SOPs may be modified and amended. The latest version of the SOPs will be available to the sampling crews at the in project files onsite during construction.

The method used for the collection of baseline samples from injection and extraction wells constructed for the groundwater remedy will ultimately be determined based on the results of the ongoing alternative sampling technique trials. During operation, these large diameter wells will be equipped with dedicated pumps and will be plumbed into the groundwater remedy; however, the infrastructure may not be installed during remedy construction when the baseline samples are collected. Given the relatively large volumes of groundwater that would have to be purged and managed if sampled using SOP-A1, alternative techniques (SOP-A18 and/or SOP-A19) are preferred.

Groundwater sampling from wells will be performed in accordance with the following SOPs, as appropriate (included in Appendix B). Additional SOPs may be added as appropriate.

- SOP-A1 – Purging and Sampling of Groundwater Monitoring Wells, Well-Volume Method
- SOP-A2 – Purging and Sampling of 1-inch-diameter Groundwater Monitoring Wells, Modified Well-Volume Method
- SOP-A3 – Purging and Sampling of Active and Inactive Water Supply Wells
- SOP-A6 – Sample Field Filtration and Preservation for Metals Analyses
- SOP-A7 – Water Level Measurements
- SOP-A8 – Field Water Quality Measurements Using a Flow-through Cell
- SOP-A9 – Calibration of Field Instruments
- SOP-A10 – Decontamination of Water Sampling Equipment
- SOP-A11 – Total Depth Measurements
- SOP-A13 – Spill Prevention, Containment, and Control Measures for Monitoring Well Sampling

- SOP-A16 – Access Routes
- SOP-A17 – Groundwater and Surface Water Mobile Integrated Sample Tracking
- SOP-A18 – Purging and Sampling of Groundwater Wells Minimal Drawdown Method
- SOP-A19 – Sampling of Groundwater Monitoring Wells Hydrasleeve No Purge Method
- SOP-A23 – Sample Handling and Custody

Groundwater Sample Laboratory Analysis and Management. Baseline groundwater samples will be analyzed at a certified laboratory in accordance with the analytes presented on Exhibit 3.2-4. The laboratory analytical suite for baseline groundwater samples collected from injection and extraction wells is consistent with the analytes listed in Exhibit 4.1-1 (Biological and Geochemical Analytical Monitoring Parameters) of the O&M Manual (Volume 1).

EXHIBIT 3.2-4
Laboratory Analysis of Baseline Groundwater Samples
Groundwater Remedy Construction/Remedial Action Work Plan
PG&E Topock Compressor Station, Needles, California

Constituent	Preferred Method	Units	Monitoring Wells	Extraction Wells	Injection Wells	IRZ Injection Wells
Total Organic Carbon (TOC)	EPA 415.1	mg/L	X	X	X	X
Total Dissolved Solids (TDS)	EPA 160.1	mg/L	X	X	X	X
Title 22 Metals (Total and Dissolved)	EPA 6010B	µg/L	X	X	X	X
Hexavalent Chromium	EPA 218.6 / SM3500-Cr B	µg/L	X			
Iron and Manganese (Total and Dissolved)	EPA 6010B	µg/L	X	X	X	X
Cations: Calcium, Potassium, Magnesium, Sodium (Total)	EPA 6010B	µg/L	X	X	X	X
Anions: Chloride, Fluoride, Bromide, Nitrate, Nitrite, Sulfate	EPA 300.0A	mg/L	X	X	X	X
Sulfide	EPA 9215	mg/L		X	X	
Alkalinity as Total, Carbonate, Bicarbonate	EPA 310.1	mg/L		X	X	X
Phosphate (low detection limits ~0.10 mg/L)	EPA 300.0A	mg/L		X	X	
Total Phosphorus (low detection limits ~0.10 mg/L)	SM 4500-P B	mg/L		X	X	
Silica	SM 4500-Si D	mg/L		X	X	
Hardness as $CaCO_3$	SM 2340 C	mg/L		X	X	
Ammonia-N	SM 4500-NH3 D	mg/L		X	X	
Total Kjeldahl Nitrogen (TKN)	SM 4500-N B	mg/L		X	X	
Biochemical Oxygen Demand (BOD)	EPA 405.1	mg/L		X	X	

Notes:

µg/L = micrograms per liter
EPA = U.S. Environmental Protection Agency
mg/L = milligrams per liter

The contracted analytical laboratory will provide the required sample containers for all samples including QC samples. All containers will have been cleaned and certified free of the analytes of concern for this project. No sample containers will be reused. The contracted laboratory will add preservatives, if required, prior to shipping the sample containers to the field or supply the preservative as appropriate. The laboratory markings will indicate the type of preservative in the container. The date and time of sampling and the initials of the sampler will be recorded on the pre-printed label immediately prior to collection. The waterproof labels will be placed carefully on the proper container, and if waterproof labels are unavailable, they will be secured using clear tape to protect the label. When shipping samples using a freight carrier such as Federal Express, the ice used in shipping containers will be double-bagged and laser printed labels and indelible ink pens will be used to complete sample labels to ensure that the samples arrive at the laboratory dry and appropriately marked. If a laboratory courier is used, no bagging of ice is necessary. Vital information regarding the collection of each sample will be recorded in a field logbook, field sampling form, and/or chain-of-custody (CoC) form, as appropriate. The following information for each sample will be recorded in the field logbook, field sampling form, or CoC form, whichever is appropriate:

- Sampling location and description (sketch and measured distances from reference points will be recorded if there is no established identification for the sample location)
- Sample ID
- Sampler's name
- Date and time of sampling
- Sample designation (e.g., composite, grab, etc.)
- Sample matrix
- Type and ID of sampling equipment
- Field measurement data (e.g., pH, temperature, conductivity)
- Field observations that may be relevant to the analysis or sample integrity (e.g., odor, color, and weather conditions)
- Associated QC blanks
- Shipping details (if the laboratory is providing courier service, the courier must sign and date the CoC forms; copies of the signed CoC forms should be transmitted to the office as soon as practical; if FedEx, UPS, or other courier is used, include shipping information for each shipment)
- Destination laboratory

Sample coolers will be transported to the laboratory immediately after sample collection. An overnight courier may be used to transport the samples. Intermediate stops will be avoided, except for emergencies, in which case the situation will be noted in the field notebooks. The laboratory will be notified that samples are being shipped. The laboratory, upon receipt of the samples, will verify and record the adequacy of preservation and will add additional preservative, if necessary.

Attachment V: RTC #1005

New C/RAWP Figure 3.3-1

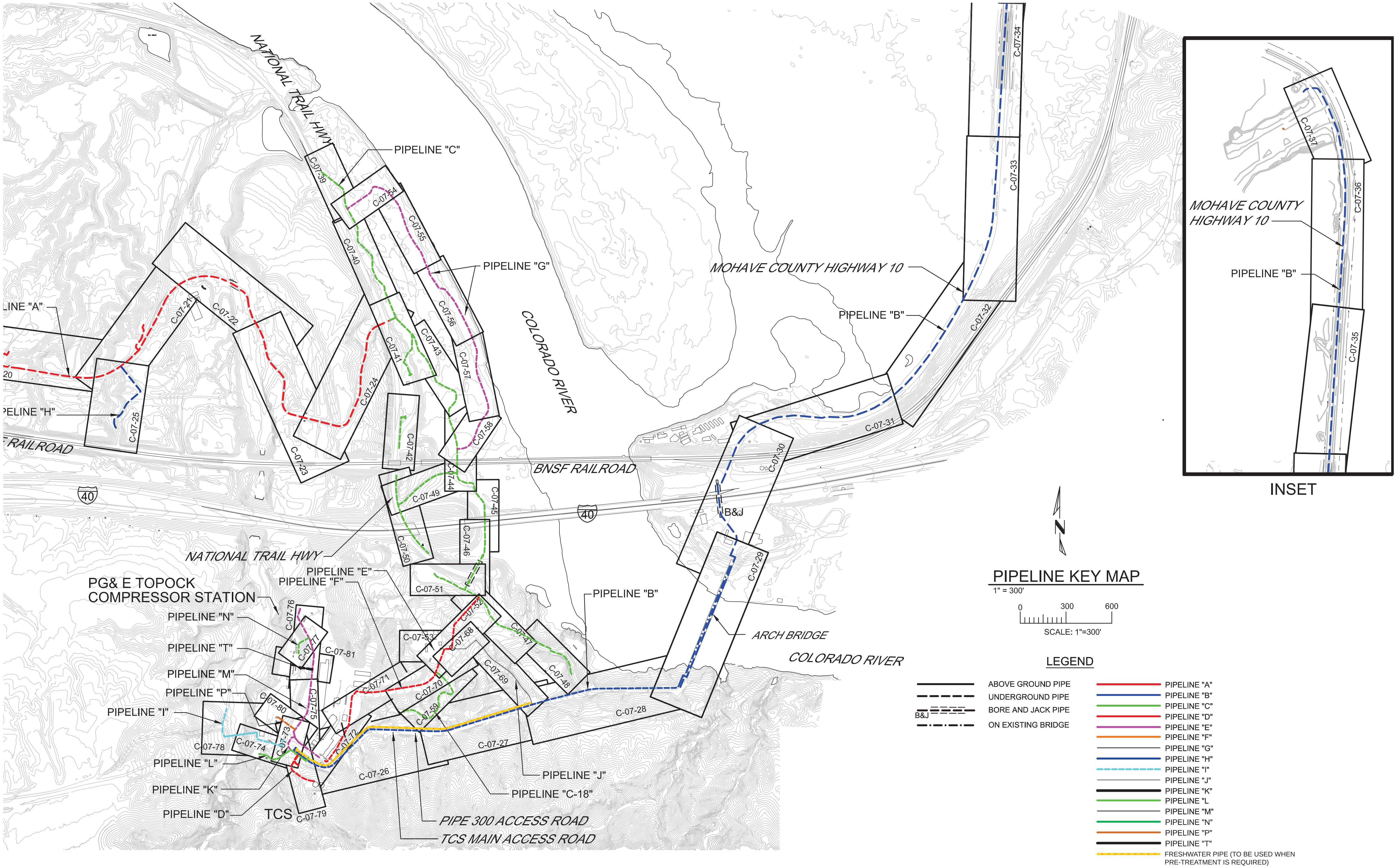
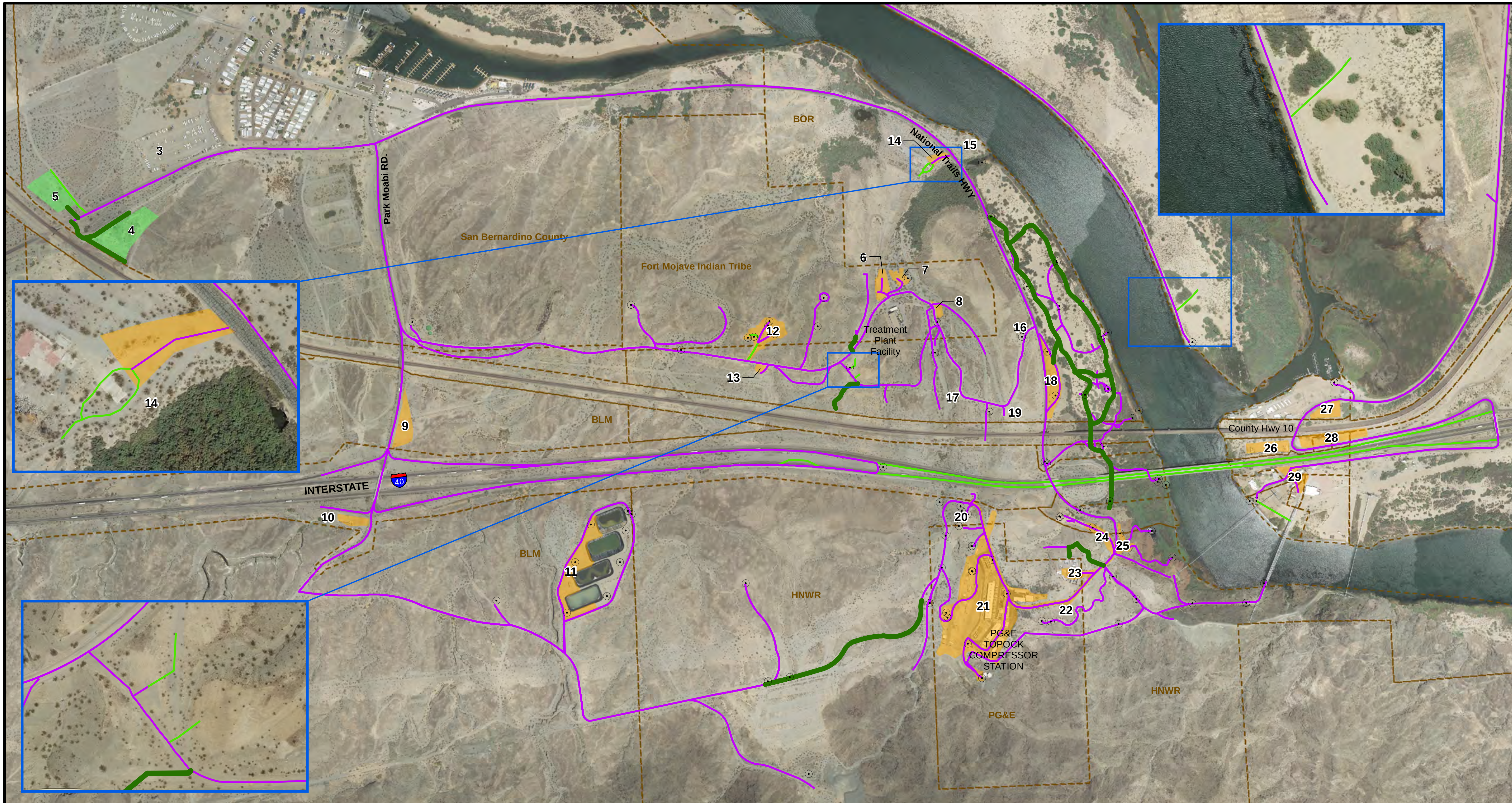


FIGURE 3.3-1
KEY PIPELINE MAP
GROUNDWATER REMEDY CONSTRUCTION/REMEDIAL ACTION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

Attachment W: RTC #1012

Revised C/RAWP Figure 4.2-3



LEGEND

- Existing Access Route (will continue to be used for remedial activities)
- Existing Route (proposed to be used as is for access for remedial activities)
- Roads to be improved or constructed for groundwater remedy
- Proposed Soil Processing (Area #5) and Construction Headquarter (Area #4) for Remediation Project
- Proposed Staging Areas for Remediation Project

Notes:
1. Area #3 will not be used as the Construction Headquarter (CHQ). The CHQ will be moved to Area #4.
2. Area #4 will be used as the primary truck inspection area. Areas #9, 18, and 23 or other staging areas might also be used depending on the specific construction activity.
3. Decontamination pads will be located in Area #4 (Construction Headquarters), Area #21 (Topock Compressor Station), and Area #23 (Transwestern Bench).
4. Areas #15, 16, 17, 19, and 20 will not be used as staging areas. Areas #16, 17, and 19 may be part of the primary work zones for remedy infrastructure along the access road.
5. Area #20 may be part of the primary work zone for installation of future provisional well IRL-6 (if determined to be needed in the future) and associated piping/concrete/vault.

N

0 900

Feet

FIGURE 4.2-3
CONSTRUCTION SITE PLAN AND ACCESS ROUTES
GROUNDWATER REMEDY CONSTRUCTION/ REMEDIAL ACTION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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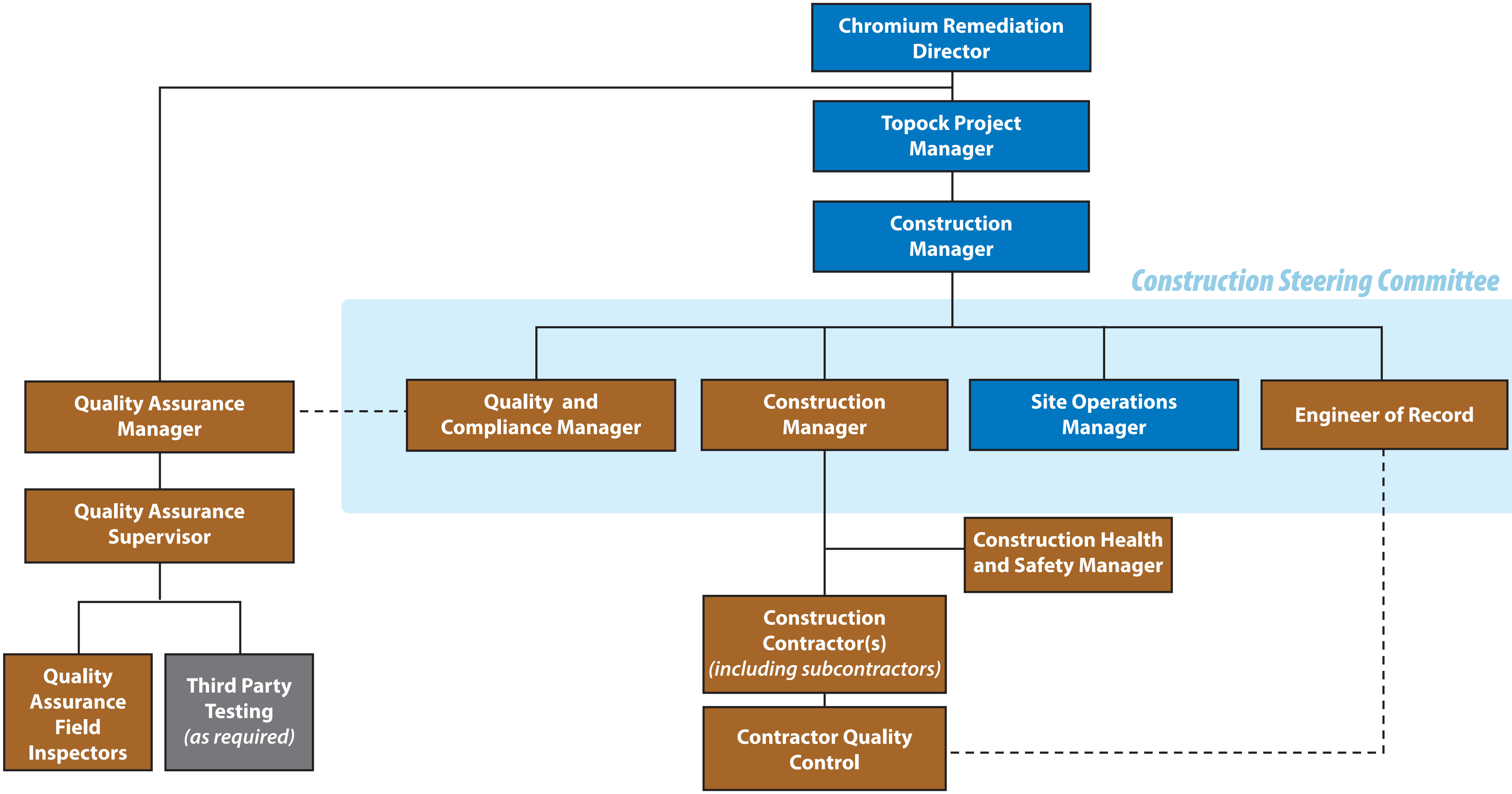
Attachment X: RTC #1055

Revised Figure 2-1 of the CQAPP (Appendix A of the C/RAWP)



Legend

PG&E | Contractors | Specialty Contractors (Testing)

- - - - Lines of communication

——— Lines of authority, responsibility, and communication

Note - for brevity, only the QA and construction QC functions are shown.

Revised May 2015

FIGURE 2-1
TOPOCK REMEDIAL ACTION PROJECT ORGANIZATION
GROUNDWATER REMEDY CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

Attachment Y: RTC #1057

Draft Third Party Testing and Inspection by Quality Assurance

DRAFT THIRD PARTY TESTING AND INSPECTION BY QUALITY ASSURANCE (90% RTC #1057 DOI-199)						
90% Spec Ref	**Page No**	**Item of Work**	**Test Required**	**Method**	**Frequency**	**Draft 3rd Party Testing and Inspection by QA**
03 30 00		Cast In Place Concrete				
	24	Source Quality Control	Inspection of batch plants, cement mills and related suppliers by Engineer			QA qualified - source inspection may apply based on local history in the area - submittal dependent from subcontractor.
03 40 00		Precast Concrete				
	7	Source Quality Control	Strength test	ASTM C31	3 cylinders per 50 cy	
03 62 00		Non Shrink Grouting				
	5	Field quality control	Flow cone, strength, segregation, and bleed tests	ASTM C1107/ C1107M	3 cubes per 25 cf of grout	
03 64 23		Crack Repair Epoxy Injection Grouting				QA qualified - 3rd Party Testing only if problems arise through normal use.
	4	Source Quality Control	Pot life test		1 per batch	
	4	Source Quality Control	Bond test	AASHTO T237	1 per batch	
	8	Field quality control	2 component ratio test		Not specified	
	8	Field quality control	Injection pressure test		Not specified	
	8	Field quality control	Crack injection tests	Visual and strength (compression)	3 cores per first 100 lf and 1 per 500 lf after	
05 05 23		Welding				QA 3rd Party Testing Required - see below:
	3	Shop weld inspections	Visual testing		100%	QA 3rd Party visual inspection at 10% rate. Inspection rate could drop or increase based on results of inspections.
			QC of WPS & WPQ			
	5	Field weld inspections (applies to 05 21 19, 05 31 00, 05 41 00)	Visual testing		100%	QA 3rd Party visual inspection at 10% rate. Inspection rate could drop or increase based on results of inspections.
	5		QC of WPS & WPQ			
	5		Radiograph (CJP Groove, Butt Joint Welds)		10% random	QA 3rd Party testing at 1% rate.
	5		Ultrasonic (All other CJP Groove Welds)		10% random	QA 3rd Party testing at 1% rate.
	5		Liquid penetrant or magnetic particle (Fillet Welds and PJP Groove Welds)		50% random	QA 3rd Party visual inspection at 5% rate.
05 12 00		Structural Steel Framing				QA 3rd Party Testing Required - see below:
	8	ASTM A6/A6M Shapes	Charpy V-notch Test	ASTM A6/A6M S30	Not specified	
	9	Fabrication welds	Visual testing		100%	QA 3rd Party visual inspection at 10% rate. Inspection rate could drop or increase based on results of inspections.
	9		Radiograph (Groove welds)		10% random	QA 3rd Party testing at 1% rate.
	9		Liquid penetrant or magnetic particle (Fillet Welds)		10% random	QA 3rd Party testing at 1% rate.
	11	High-strength bolted connections	RCSC Specification for Structural Joins using ASTM A325 or A490 bolts Applies to 05 21 19	Installation and tightening of bolts	Not specified	QA 3rd Party visual inspection at 10% rate. Inspection rate could drop or increase based on results of inspections.
05 50 00		Metal Fabrications				
	22	Fabrication welds	Visual testing	AWS D1.1/D1.1M	1	
	22	Hot-Dip Galvanizing	Inspect and test	ASTM A123/A23M and A153/A153M	Not specified	
	27	Owner furnished QA	Special inspections	Not specified	Not specified	QA source inspection conducted based on risk and complexity - submittal dependent
	27	Stud shear connectors (applies to 05 31 00)	Weld 2 test studs	AWS D1.1/D1.1M	Each production period	QA Inspection at 100% until satisfactory - then reduce over time to 10% inspection
			Torque test threaded anchor studs	AWS D1.1/D1.1M	Each production period	
			Visual testing		Not specified	
05 52 00		Metal Railings				
	3	Railings	Calculations stamped by Registered Civil or Structural Engineer			
08 33 23		Overhead Coiling Doors				
	5	Source Quality Control	UL Certificate of Inspection for oversize fire rated door			
08 80 00		Glazing				
	10	Field quality control	Hose test		Not specified	
08 90 00		Louvers and Vents				
	3	Source Quality Control	Factory performance tests	Airflow versus pressure loss		
	3	Source Quality Control		Rain penetration data		
09 96 35		Chemical-Resitant Coatings				
	5	Field quality control	Electrical spark or other tests		As required (by Engineer)	

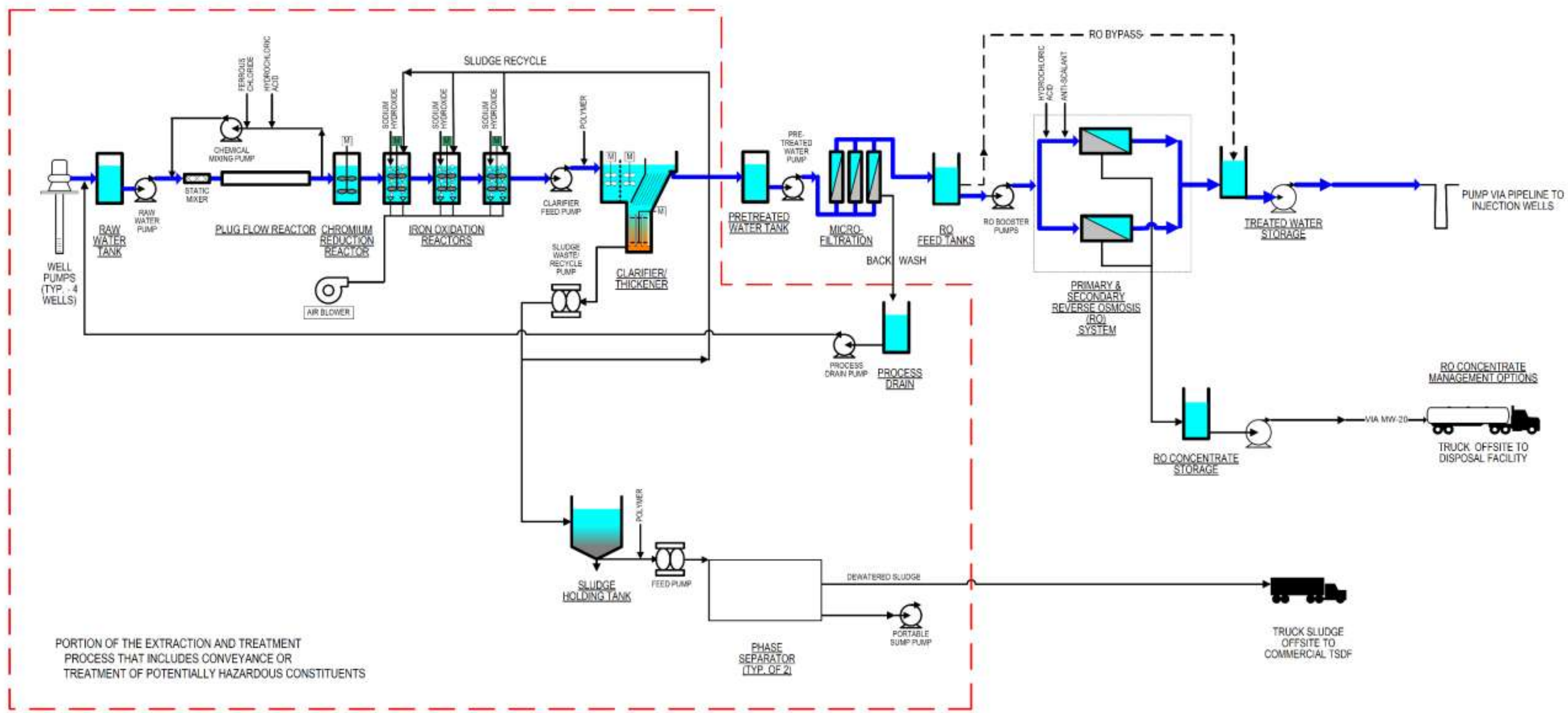
09 97 13		Steel Tank Coatings				
	8	Source Quality Control	Shop inspection of surface preparation and shop application of paints by Engineer	Visual		QA qualified for source inspection - based on submittal at the time.
	17	Coating surfaces	Thickness testing	DFT Gauge SSPC-PA 2	100%	QA Inspection may be required based on submittal from Subcontractor
	17	Submerged coated surfaces	Holiday (pinhole) Testing	NACE RP0188	100%	QA Inspection may be required based on submittal from Subcontractor
22 30 00		Plumbing Equipment				
		Exchangers	Hydrostatic Testing (Factory)	BPVC Section VIII, Div. 1	Not specified	
23 34 00		HVAC Fans				
	12	Source Quality Control	Performance	AMCA 210		
	12	Source Quality Control	Noise	AMCA 300		
	12	Source Quality Control	Fabrication	AMCA 99		
23 81 00		Unitary Air-Conditioning Equipment				
	11	Source Quality Control	Expansion coil leak test	200 psig air underwater. Pressure test to 450 psig.	Not specified	
	11	Source Quality Control	Electrical heating coil test	2000 volt dielectric test	Not specified	
	12	Field quality control	Leak test			
	12	Field quality control	Refrigerant pressure test			
	12	Field quality control	Evaluate (if req'd)			
	12	Field quality control	Dehydrate (if req'd)			
	12	Field quality control	Charge condensing unit			
26 05 05		Conductors				
	17	<=600 V	Conductor test	UL 44 and 854	Not specified	
	17	>600 V	Conductor test	WC 71 and AEIC CS 8 corna level test for TR-XLP insulated cable	Not specified	
26 08 00		Commissioning of Electrical Systems				
	6	Systems	Voltage Field Test			
	7	Systems	Equipment Line Current Tests			
		Switchgear and Switchboard Assemblies	Visual and mechanical inspection			
26 13 16.02		Pad-Mounted Switchgear				
	15	Switchgear	Production test assembly	IEEE C37.20.3	Not specified	
	15	Fuses	Production test	IEEE C37.46	Not specified	
26 22 00		Low-Voltage Transformers				
	4	Transformers	Production test	NEMA ST20	Not specified	
26 24 16		Panelboards				QA Start-up inspection and testing will be required based on O&M Manual.
	5	Internal Surge Suppressors	Production test: Category C3 high exposure waveform (20 kV-1.2/50us, 10kA-8/20 us)	IEEE C62.41	Not specified	Independent QA Source Inspection required.
26 24 19		Motor Control Centers				
	11	Controller	Production test	Manuf. Standard	Not specified	
26 29 23		Low-Voltage Adjustable Frequency Drive System				
	11	Control panels	Factory test		100%	QA Start-up inspection and testing will be required based on O&M Manaul.
	11	Drive components	Functional test of dioides, transistors, and GTOs at 125 C		Not specified	
	12	Drive components	TTL and CMOS chips at 70 C		Not specified	
	12	Drive components	Run power sections at 40C for 12 hours and with motors for 6 hours		Not specified	
	12	Assembled drive	Test at 40C and full load, full speed, for 4 hours		Not specified	
	12	Drive components	Power capacitors and active components		Not specified	
	12	Controller and motor	Operate throug its range and at rated power supply load for 1 hour		Not specified	
	12	Harmonic filters	Performance test that filters do not resonate with rest of system		Not specified	
	12	Motors	Motor test (per mechanical equipment specifications)		Not specified	
31 23 23		Fill and Backfill				QA 3rd Party Testing Required - see below:
	4	Source Quality Control	Import material gradation tests	ASTM C136	1 sample/1,500 cy	QA 3rd Party Testing once per source.

	9	Field quality control	In Place Density and Moisture	ASTM D6938	1 per 12 inch lift / 500 sf or 1 per 25 lf of trench	QA 3rd Party Testing required at 10% specification test frequency. Rate may be reduced over time based on passing results.
	9	Field quality control	Sand cone test	ASTM D1556	1 per fill type	QA visually spot checked in the field
	9	Field quality control	Proof roll fill materials	Loaded water truck, dump truck or similar vehicle	1 per fill type that is too coarse for density gauge	QA visually spot checked in the field
31 23 23.15		Trench Backfill				
	6	Earth backfill	Gradation tests	ASTM C136		QA 3rd Party Testing once per source.
	6	Source Quality Control	Trench stabilization material gradation tests	ASTM C136	Not specified	QA 3rd Party Testing once per source.
	6	Source Quality Control	Bedding and pipe zone material gradation tests	ASTM C136	Not specified	QA 3rd Party Testing once per source.
	6	Source Quality Control	Controlled low strength material - Laboratory performance of mix design		Not specified	
	6	Source Quality Control	Concrete - Laboratory performance of mix design		Not specified	
31 32 00		Soil Stabilization				
	3	Field quality control	Owner acceptance of preparation			QA visually spot checked in the field
	3	Field quality control	Owner acceptance of installation			QA visually spot checked in the field
32 11 23		Aggregate Base Courses				QA 3rd Party Testing once per source.
	4	Source Quality Control	Gradation tests	ASTM C136	Not specified	
	4	Source Quality Control	Plasticity index			
	7	Field quality control	Gradation tests (placed material)	AAHSTO T11 and T27	1 sample/500 tons	QA 3rd Party Testing once per source.
	7	Field quality control	In Place Density and Moisture	ASTM D1557 Method D	One test per gradation produced	QA 3rd Party Testing required at 10% specification test frequency. Rate may be reduced over time based on passing results.
	8	Field quality control	In Place Density and Moisture (in place material)	ASTM D1556 or D9638 (nuclear)	1 for each 200 tons or every 2000 sq ft	
32 12 16		Asphalt Paving				
	9	Field quality control	Field density tests	ASTM D2950	1 per 500 tons or every 4 hours	QA 3rd Party Testing required at 10% specification test frequency. Rate may be reduced over time based on passing results.
	9	Field quality control	Asphalt content, aggregate gradation		1 per 500 tons or every 4 hours	QA 3rd Party Testing required at 10% specification test frequency. Rate may be reduced over time based on passing results.
	9	Field quality control	Mix design (specific gravity)		1 per 1000 tons or every 8 hours	QA 3rd Party Testing required at 10% specification test frequency. Rate may be reduced over time based on passing results.
32 31 13		Chain Link Fences and Gates				
	4	Field quality control	Fabric tension and line post rigidity	ASTM F1816		
33 05 01.02		Ductile Iron Pipe and Fittings				
	6	Source Quality Control	Pressure Testing, flushing and system sterilization (Section 33 12 16)			
33 05 13		Manholes				
	8	Source Quality Control	Manhole section mat & permeability test	ASTM C14	Up to 5%	
	8	Source Quality Control	Manhole concrete compressive Strength	ASTM C31/31M, C39/C39M, C192/C192M	2 cylinders per manhole	
	13	Field quality control	Hydrostatic testing		25 percent (minimum)	
33 16 13.14		Frac Tanks				
	3	Source Quality Control	Factory test and inspections			
33 46 00		Subsurface Drainage				
	9	Field quality control	Drain line grade	Field survey	1 per 250 lf	
	9	Field quality control	Drain line streching			
40 50 10		Underground Piping				HDPE Fusion Welding - QA Inspection required - spot checked in the field. 3rd Party Pressure Testing may be requested of 10% of steel and HDPE pipe sections. QA 3rd Party visual inspection at of bolted flange connections at 10% rate. Inspection rate could drop or increase based on results of inspections.
40 50 20		Aboveground Piping				HDPE Fusion Welding - QA Inspection required - spot checked in the field. 3rd Party Pressure Testing may be requested of 10% of steel and HDPE pipe sections. QA 3rd Party visual inspection at of bolted flange connections at 10% rate. Inspection rate could drop or increase based on results of inspections.
40 90 00		Instrumentation and Control for Process Systems				QA Qualified based on complexity
	36	Source Quality Control	Factory Demonstration Test of Panels			
41 22 13.13		Overhead Cranes				
	10	Source Quality Control	Control panels and equipment inspection			
	10	Source Quality Control	Factory No-load run test			
	10	Field quality control	Alignment test		Each crane	
	10	Field quality control	Performance test (load)	ASME B30.11 and B30.16	Each crane	
43 12 01		Compressed Air Systems				

	6	Source Quality Control	Control panels and equipment inspection			
	6	Source Quality Control	Control panels and equipment test			
43 40 02		High Density Polyethylene Tank				QA Qualified source inspection may apply based on complexity
	4	Source Quality Control	Hydrostatic testing			
43 40 13		Steel Storage Tank				QA Qualified source inspection may apply based on complexity
	4	Source Quality Control	Inspections,			
	4	Source Quality Control	Hydrostatic testing			
	4	Source Quality Control	Laminate test reports			
	4	Field quality control	Hydrostatic testing	24 hour leak test	Each tank	
44 42 56.04		Submersible Pumps				
	2	Source Quality Control	Submersible Motor Function Test	HIS 11.6		
44 42 56.09		Submersible Centrifugal Pumps				
	5	Source Quality Control	Factory test with actual motor and pump	Hydraulic Institute	All pumps	
	6	Field quality control	Alignment test			
	6	Field quality control	Performance test			
44 42 56.10		Horizontal End Suction Centrifugal Pumps				
	2	Source Quality Control	Factory inspection and test		All pumps	
	2	Source Quality Control	Functional test	Manuf. Standard	All pumps	
	2	Source Quality Control	Performance test	Hydraulic Institute	All pumps	
	2	Source Quality Control	Motor test	Manuf. Standard	All pumps	
	2	Source Quality Control	Hydrostatic test	Manuf. Standard	All pumps	
	3	Field quality control	Alignment test		All pumps	
	3	Field quality control	Vibration test		All pumps	
	3	Field quality control	Performance test		All pumps	
44 42 56.10		Horizontal End Suction Centrifugal Pumps				
	2	Source Quality Control	Functional test	Manuf. Standard	All pumps	
	3	Field quality control	Alignment test		All pumps	
44 44 13.01	3	Field quality control	Performance test		All pumps	
		Chemical Metering Pumps				
	4	Source Quality Control	Functional test	Manuf. Standard	All pumps	
	5	Field quality control	Functional test		All pumps	
	5	Field quality control	Performance test		All pumps	
Remediation Wells						QA 3rd Party check on 1) plumbness/alignment and 2) video surveys to ensure proper installation

Attachment Z: RTC #1155

Revised Figure 4-1 of the IM-3 Decommissioning Plan (Appendix F of the C/RAWP)



NEW LEGEND ADDED IN RESPONSE RTC #1155

Primary process line

Membrane housing for reverse osmosis or microfiltration

Clarifier (orange shading indicates sludge accumulation)

Secondary process line

Process tank containing liquids (blue indicates water and gray or orange indicate solids or sludge)

Oxidation tank (circles in blue shaded area indicate bubbles)

FIGURE 4-1
GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
PROCESS FLOW DIAGRAM
IM3 DECOMMISSIONING, REMOVAL, AND RESTORATION WORK PLAN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Attachment AA: RTCs #1157, #1186 and #1188

New REMEDY-SOP-10: Sampling of Concrete/Asphalt Demolition Waste

Standard Operating Procedure
PG&E Topock Groundwater Remedy
Operation and Maintenance Plan

Title: Sampling of Concrete/Asphalt Demolition Waste

Number: Remedy-SOP-10_Rev0

Creation Date: 6/19/2015

1 Background and Scope

Pacific Gas and Electric Company (PG&E) is implementing a groundwater remedy near the intersection of Park Moabi Road and Interstate 40, approximately 12 miles southeast of Needles, California at the PG&E Topock Compressor Station (TCS). Construction and demolition of remedial facilities is expected to generate concrete and asphalt pavement rubble that will be managed for reuse, recycling, or offsite disposal.

Concrete and asphalt rubble will be managed as waste as outlined in Waste Management Plans for the project: see Appendix F of the Construction/Remedial Action Work Plan (Interim Measure No. 3 Decommissioning, Removal and Restoration Work Plan), and Appendix R of the Construction/Remedial Action Work Plan (Waste Management Plan). For concrete and asphalt associated with known hazardous waste or hazardous materials operations (such as the inside of containment structures for process chemicals) or that exhibit visual evidence of contamination, surface samples will be collected prior to demolition to determine if the material is contaminated. If contaminated, the concrete/asphalt demolition waste will be managed by either (1) offsite disposal under the assumption that the surface sample is representative of the entire mass of the slab, or (2) removing the surface contamination by cleaning (e.g., pressure washing with surfactant solution) or scarifying, and managing the cleaning fluids/scarified materials separately from the remaining concrete/asphalt mass as different waste streams. The classification and management requirements for the waste streams are described in the Waste Management Plans and are not repeated herein.

The objective of this Standard Operating Procedure (SOP) is to describe the procedure for sampling of concrete and asphalt surfaces/slabs to be demolished during the remedial action for purposes of determining whether the material is contaminated. Representative samples will be collected from concrete and asphalt surfaces/slabs associated with known hazardous waste or hazardous materials operations as described herein.

Concrete and asphalt slabs that are not associated with known hazardous material operations and that exhibit no visual evidence of contamination (staining, residue, etc.) will not be sampled. Asphalt that exhibits oil stains in areas with no history of polychlorinated biphenyl use will not be sampled.

2 Equipment/Supplies

- Appropriate personal protective equipment (PPE)
- Health and Safety Plan
- Waste Management Plan (see Appendix F or Appendix R of the Construction/Remedial Action Work Plan)
- Map and/or detailed description of concrete and asphalt sampling locations
- Coring drill and coring barrel, rotary impact hammer variable speed drill, or similar

- Hose and water supply for coring drill
- Aluminum foil
- Stainless steel chisel and hammer
- Stainless steel spoon
- Plastic Ziploc bags
- Sample bottles/jars
- Sample labels
- Sample logbook
- Chain-of-custody forms
- Chain-of-custody seals
- Waste container (e.g., 55-gallon drum)

3 Preconditions

- **Sampling and Analysis Plan:** A sampling and analysis plan will be prepared and provided by the Construction Manager or designee.
- **Sampling Approach:** In general, sampling areas shall be determined based on the history of activities performed in the demolished structure or pavement. The approach is based on defining distinct areas of the structure, roadway, or pad or any other feature (e.g., sump), based on historical use. The preferred sampling timing is prior to the demolition of the concrete or asphalt surface.
    - One composite sample will be collected at each distinct area of the structure for demolition (e.g., roadway, concrete pad, process area, tank containment).The composite sample will be collected from locations most likely to have contacted hazardous waste or hazardous materials, such as knowledge of use (inside containment structures for process chemicals), areas of visual staining, or other indication of potential contamination (coloration, or odor) to identify the nature of the contaminants.
    - Prior to sample collection, sample locations will be marked, typically by painting boxes on the designated slab. The samples will be collected within the interior of the painted box but not the painted surface.
    - Samples will be collected by chipping or coring. Typically samples should be no deeper than 1 inch unless staining or discoloration indicates that contamination may extend below that depth. Sampling logs shall record he depth of core samples. Typically, three chips or cores will be collected from each designated area; sufficient sample will be collected for the designated analytical methods.
- **Analytical Parameters:** Analytical parameters shall be selected based on the history of activities performed in the area. The analytical lab shall be consulted to determine sample volumes, preservatives, containers, and any other special requirements.

4 Procedure

1. Take photograph(s) of sample location.
2. Connect power or water supply line to drill, per the drill manufacturer’s instruction manual.
3. Remove debris with a clean brish or cloth prior to drilling. Place the drill over the specified sampling location.
4. For coring:

- Keep a steady downward pressure on the coring barrel.
- Raise the core barrel every few minutes to facilitate the removal of drill cuttings.
- Drill sample so that it extends throughout the entire thickness of the concrete or asphalt.

- Once the cut has been completed, remove the coring barrel from the hole.Typically the concrete/asphalt core will remain in the core barrel. Tap the outside of the core barrel gently with a hammer until the core drops out.

5. For drilling:
   - Lock a 0.5"-1" drill bit into the impact hammer drill. and an impact drill.
   - Drill vertically to the desired depth, capturing chips or powder with a scoop or spoon. The sampler can also drill multiple holes closely together so that the concrete/asphalt between the drilled holes breaks into chips.
6. Place sample, including powder and smaller chips generated during the drilling, in a stainless steel bowl.
7. To collect a COMPOSITE sample:

   NOTE: If analytical laboratory provides alternative composite sample collection procedures, follow the instructions of the laboratory instead of those listed below.

   - Repeat steps 1 through 6 for core/chip sample locations that are to be composited.
   - After all samples to be composited are in a stainless steel bowl, break samples into smaller pieces (the size of pieces shall be instructed by analytical lab).
   - Use a stainless steel spoon to homogenize the sample.
   - Transfer the sample into sample container(s).
   - Attach sample label, custody seal, and immediately place sample into cooler with ice.
8. Transfer any drill cuttings left over from the sampling into a waste container.
   - Ensure waste container is sealed, labeled, and handled appropriately.

5 References

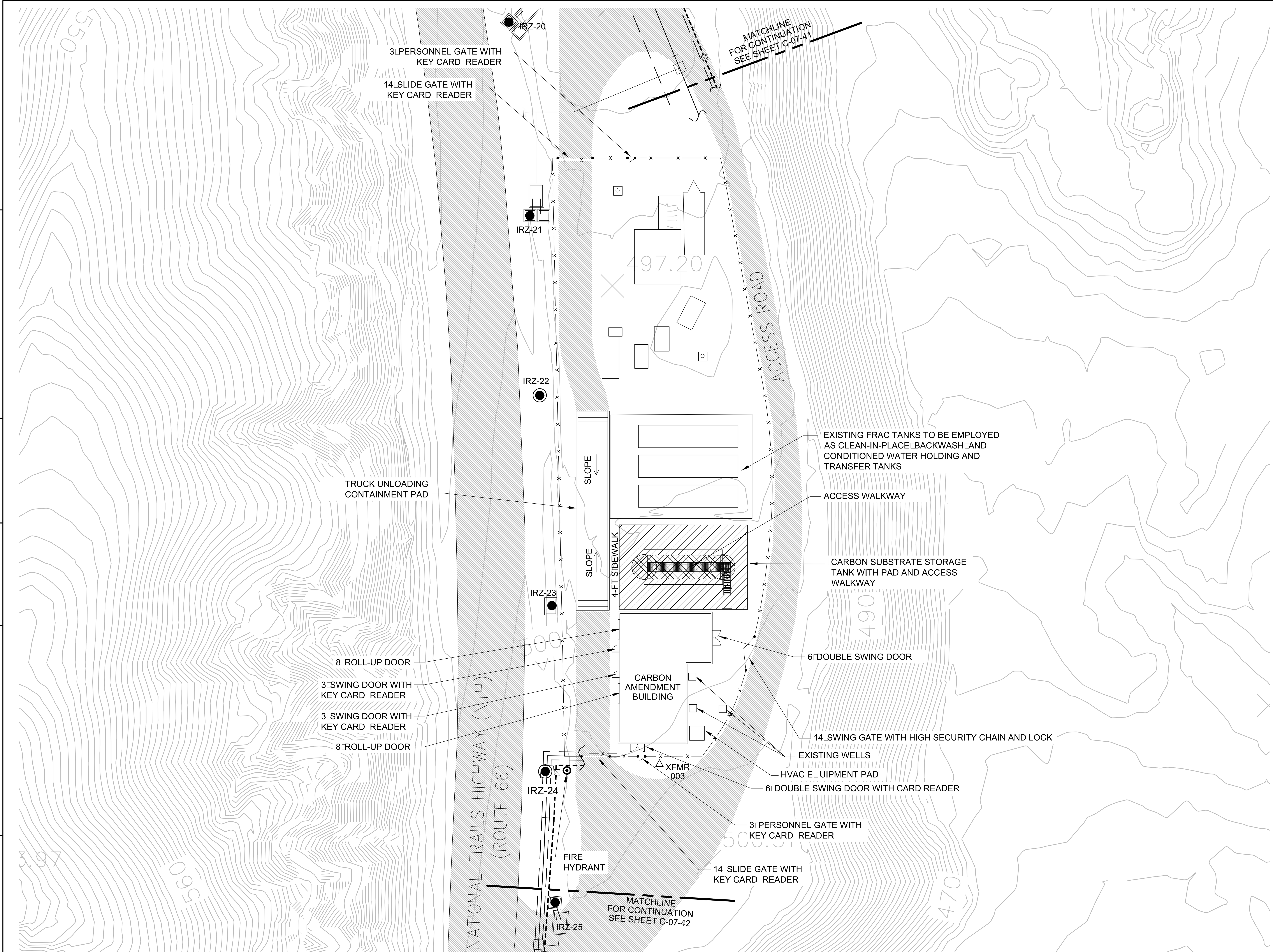
Byrnes, Mark Edward. 2008. *Field Sampling Methods for Remedial Investigations, Second Edition.* CRC Press.

U.S. Environmental Protection Agency (EPA). 2002. *RCRA Waste Sampling Draft Technical Guidance*. http://www.epa.gov/epawaste/hazard/testmethods/sw846/samp_guid.htm. Accessed May 12, 2015.

Attachment BB: RTC #136

Transwestern Bench and MW-20 Bench – Consolidation of Carbon Storage/Dosing Design and Operations

The final design will address DTSC's comments and will replace the leach field at the TW Bench with a septic tank (specifically Drawings C-008-03 and C-008-04.



NOTE:

1. CARBON AMENDMENT AND WELL MAINTENANCE BUILDING FOUNDATIONS INCLUDE A 6" CONCRETE CURB TO PROVIDE SECONDARY CONTAINMENT FOR PROCESSES WITHIN BUILDINGS.

N

0 20 40 60

SCALE: 1"□20□

- DRAFT - NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY: SO / SUPV / DSGN / DWN / CHKD / OK / DATE 8/5/15 / SCALES

TOPOCK GROUNDWATER REMEDIATION PROJECT

MW-20 BENCH AREA PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
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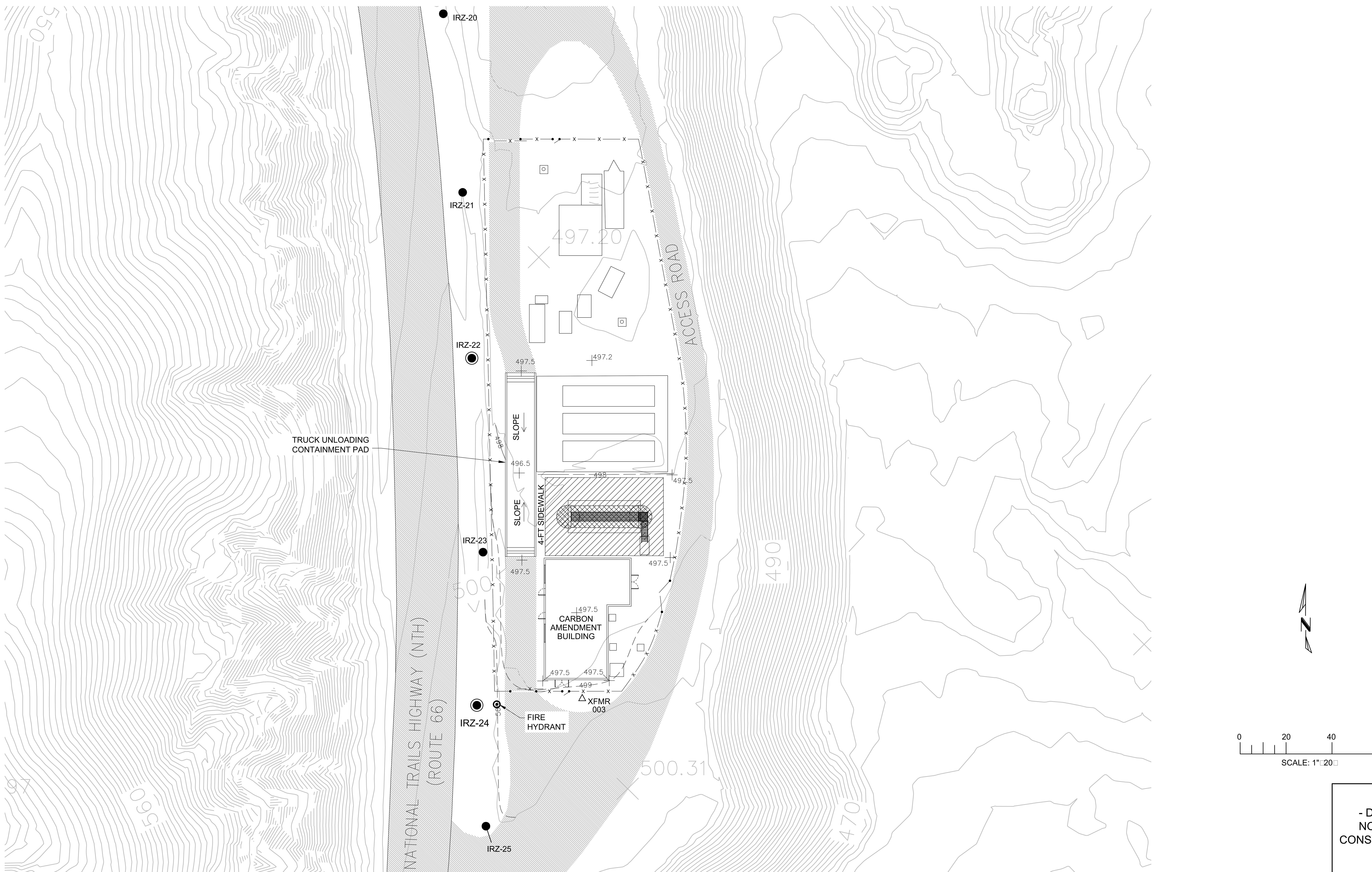

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY: SO, SUPV, DSGN, DWN, CHKD, OK, DATE 8/5/15, SCALES

TOPOCK GROUNDWATER REMEDIATION PROJECT

MW-20 BENCH
GRADING PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
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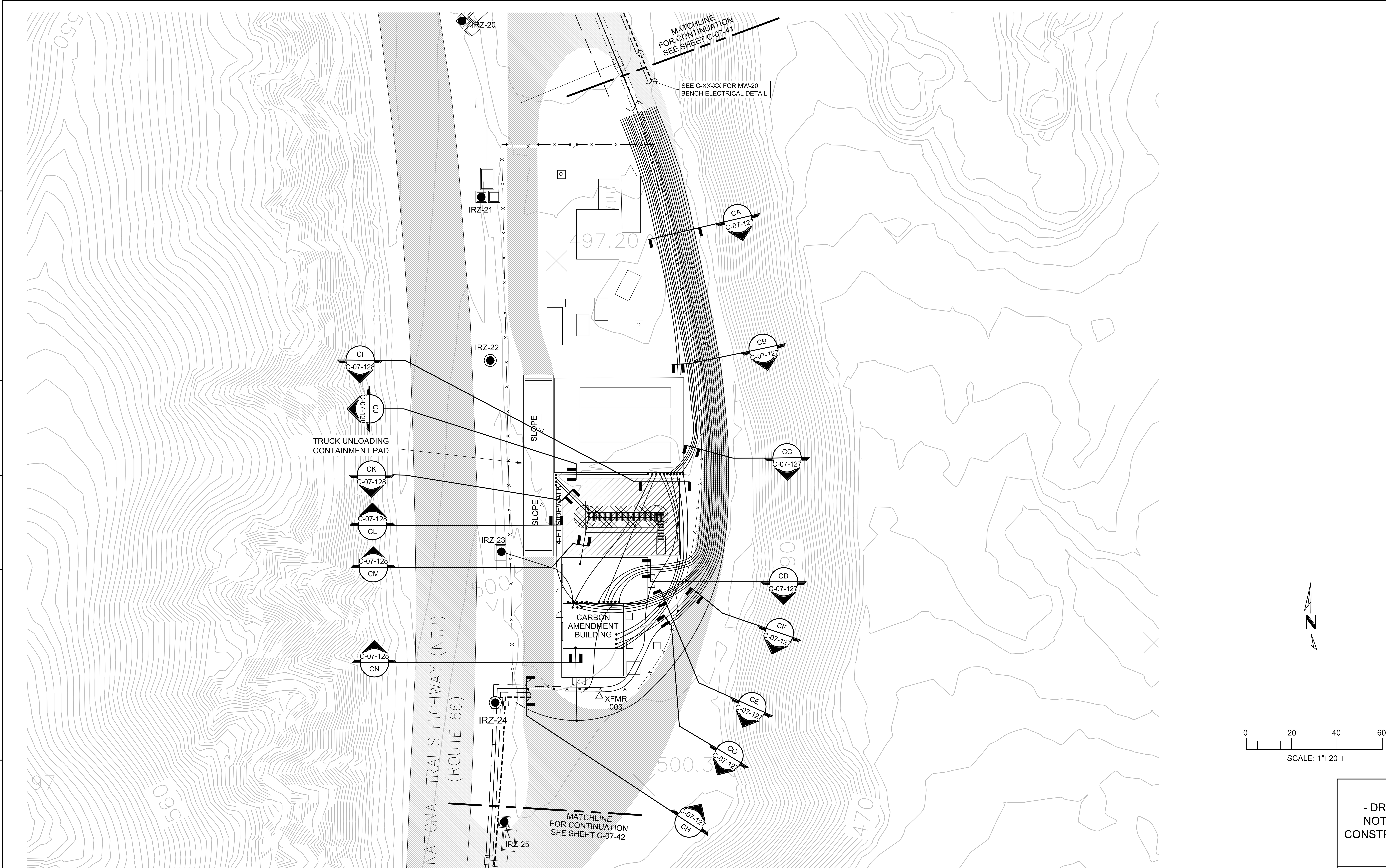

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

REVISIONS

APPROVED BY	
SO	
SUPV	
DSGN	
DWN	
CHKD	
OK	
DATE	8/5/15
SCALES	

TOPOCK GROUNDWATER REMEDIATION PROJECT

MW-20 BENCH YARD PIPING PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
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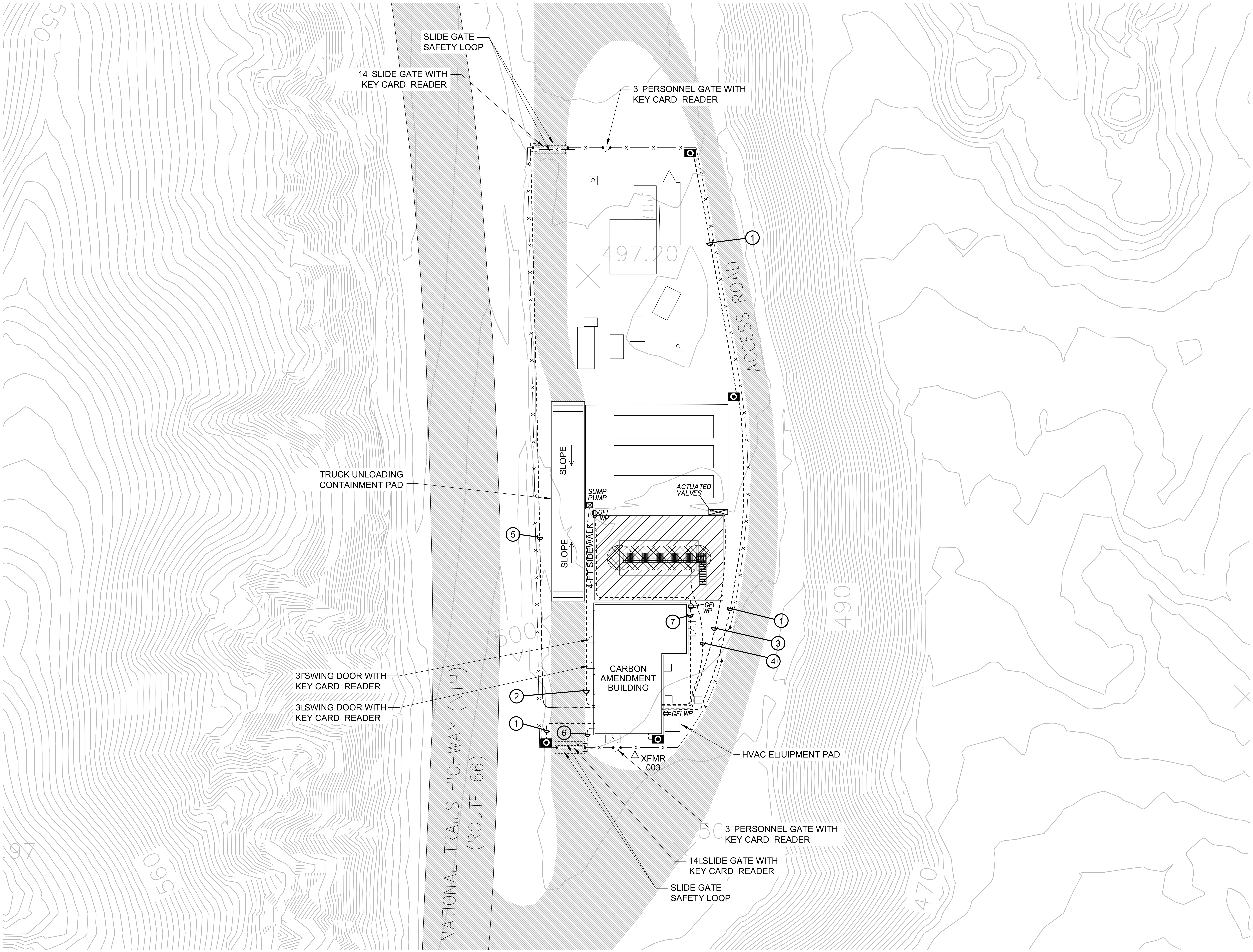


NOTES:

1. ELECTRICAL HAZARD CLASSIFICATIONS:

   A. CLASS I□DIV I WITHIN A 5-FT RADIUS OF THE CARBON STORAGE TANK VENTS.

   B. CLASS I□DIV II WITHIN A 10-FT RADIUS OF THE CARBON STORAGE TANK VENTS (FROM VENT ELEVATION TO GROUND).

   C. CLASS I□DIV II FROM GROUND SURFACE TO 18-INCHES ABOVE GRADE WITHIN A 10-FT RADIUS OF THE TANK FOOTPRINT.

   D. CLASS I□DIV II WITHIN THE CARBON AMENDMENT BUILDING WHERE DOSING LINES CONTAIN □10% ETHANOL□FIRE RATED WALLS MAY BE USED TO MINIMIZE THE FOOTPRINT OF THE CLASSIFIED AREA.

   E. CLASS I□DIV II WITHIN A 10-FT RADIUS OF THE VENTS OF THE E□UIVALENT HAZ CLASS LOCATIONS WITHIN THE BUILDING.

2. SECURITY FEATURES BY OTHERS. CONDUIT INSTALLATION TO FEATURES BY CONTRACTOR.

LEGEND:

- GFI WP OUTDOOR ELECTRICAL RECEPTACLE
- CAMERA

CONDUIT NOTES:

1. 1" EMPTY CONDUIT W/ PULL LINE FOR CAMERAS.
2. (3) □10□(1) □10G□1" CONDUIT FOR TRUCK UNLOADING CONTAINMENT PAD (LOCAL DISCONNECT).
3. 2" CONDUIT TO CONTAINMENT MANIFOLD ACTUATED VALVES.
4. 2" CONDUIT TO CARBON SUBSTRATE TANK LEVEL TEMPERATURE TRANSMITTERS AND LEVEL SWITCH.
5. 1" EMPTY CONDUIT W/ PULL LINE TO NORTH END SLIDE GATE AND CARD READERS.
6. 1" EMPTY CONDUIT W/ PULL LINE TO SOUTH END SLIDE GATE AND CARD READERS.
7. (2) □10□(1) □10G□1" CONDUIT FOR OUTDOOR RECEPTACLES□RUN TO LP-3 INSIDE CARBON AMENDMENT BUILDING.

N

0 20 40 60

SCALE: 1"□20□

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

REVISIONS

APPROVED BY: SO, SUPV, DSGN, DWN, CHKD, OK, DATE 8/5/15, SCALES

TOPOCK GROUNDWATER REMEDIATION PROJECT

SECURITY AND ELECTRICAL OUTLET

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS

C-06-04 REV 0

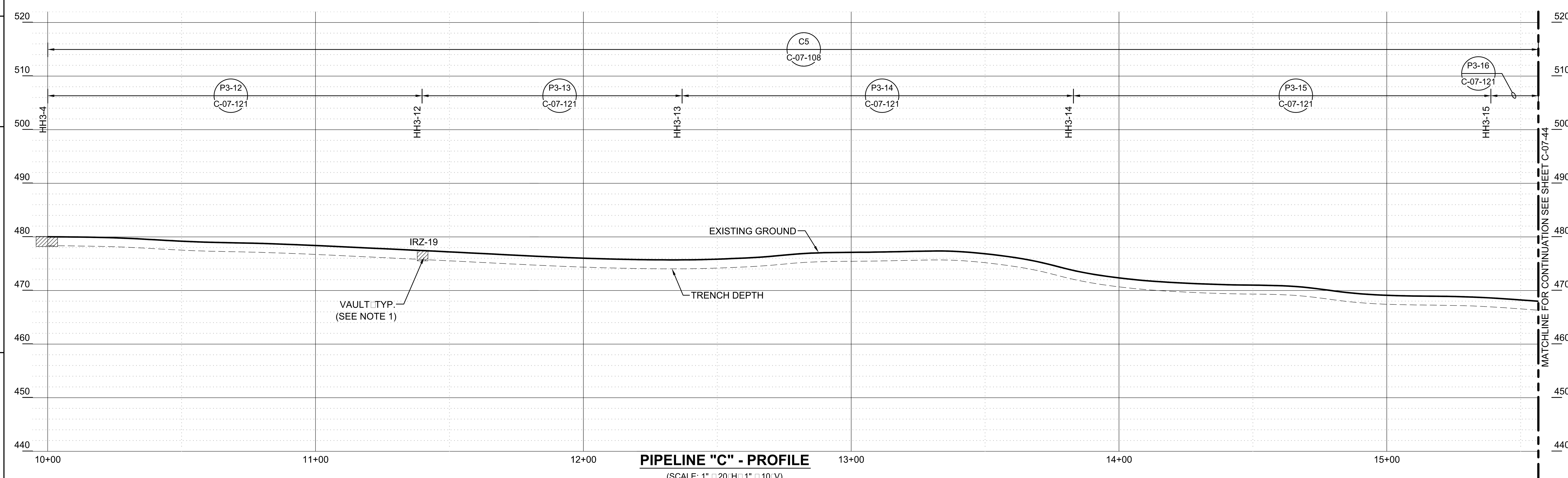
H1808

08/04/2015, 19:44, G:\Graphics\AR\TOPOCK-01\Submittal_100%\DWGs\C-Civil\C-06-01-02-03-04_MW20Bench.dwg, Tab: C-06-04

NOTES
1. VAULT DETAILS SHOWN ON SHEETS M-X-X AND S-X-X.
2. SEE CONDUIT AND CABLE SCHEDULES AND SINGLE LINE DIAGRAMS ON SHEETS E-00-12 THRU E-00-20.
3. CLEANOUT LOCATIONS PROVIDE CLEANOUT PIPING FOR ALL INJECTION EXTRACTION BACKWASH AND REMEDY-PRODUCED WATER LINES AT INDICATED LOCATIONS (SEE DETAIL C-07-111).

PIPELINE "C" - PLAN

(SCALE: 1" 20)



PIPELINE "C" - PROFILE

(SCALE: 1" 20 H 1" 10 V)

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY: SO, SUPV, DSGN, DWN, CHKD, OK, DATE 8/5/15, SCALES

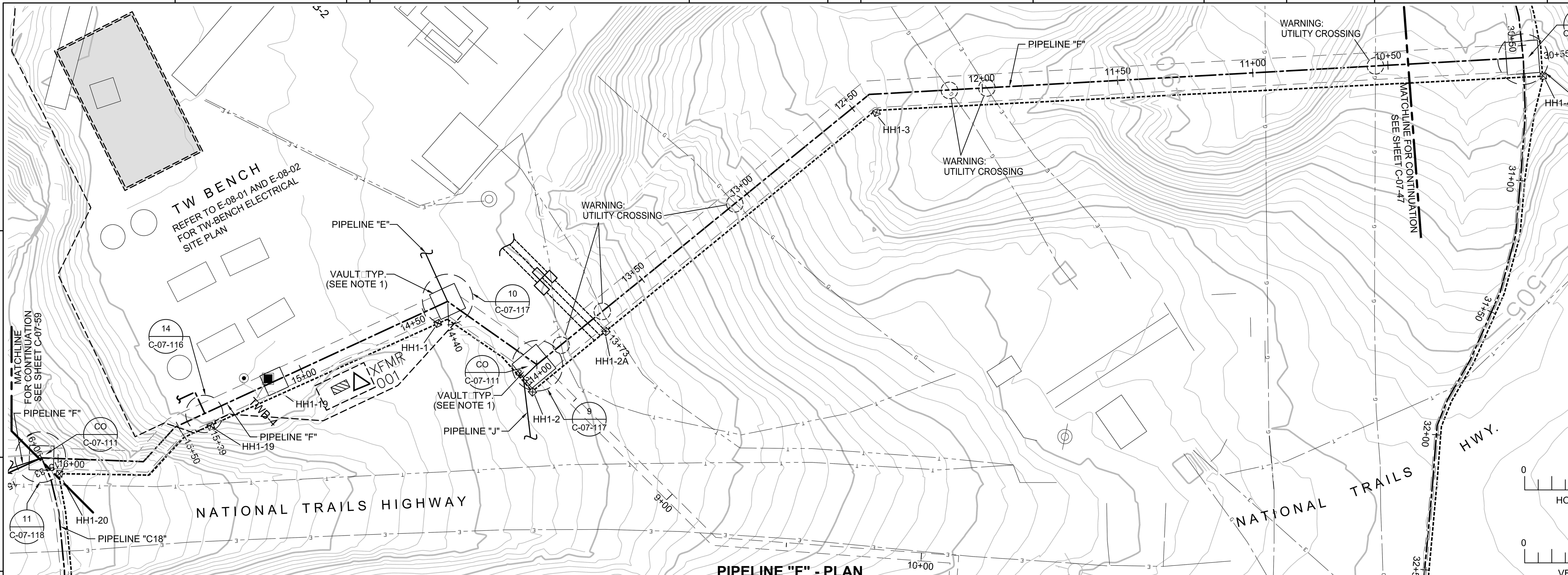
TOPOCK GROUNDWATER REMEDIATION PROJECT

PIPELINE - PLAN AND PROFILE
PIPELINE "C5"
STA 10 00 TO STA 15 50

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-07-43 REV 0

08/04/2015 19:56 G: Gra s AR TOPOCK-01 S. bm al 100% DWGs C-C IC-07-39 59 Pla Pr d g Tab: C-07-43



NOTES
1. VAULT DETAILS SHOWN ON SHEETS M-X-X AND S-X-X.
2. SEE CONDUIT AND CABLE SCHEDULES AND SINGLE LINE DIAGRAMS ON SHEETS E-00-12 THRU E-00-20.
3. CLEANOUT LOCATIONS PROVIDE CLEANOUT PIPING FOR ALL INJECTION, EXTRACTION, BACKWASH AND REMEDY-PRODUCED WATER LINES AT INDICATED LOCATIONS (SEE DETAIL C-07-111).

PIPELINE "F" - PLAN
(SCALE: 1" = 20')

PIPELINE "F" - PROFILE
(SCALE: 1" = 20' H, 1" = 10' V)

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING
ARCADIS

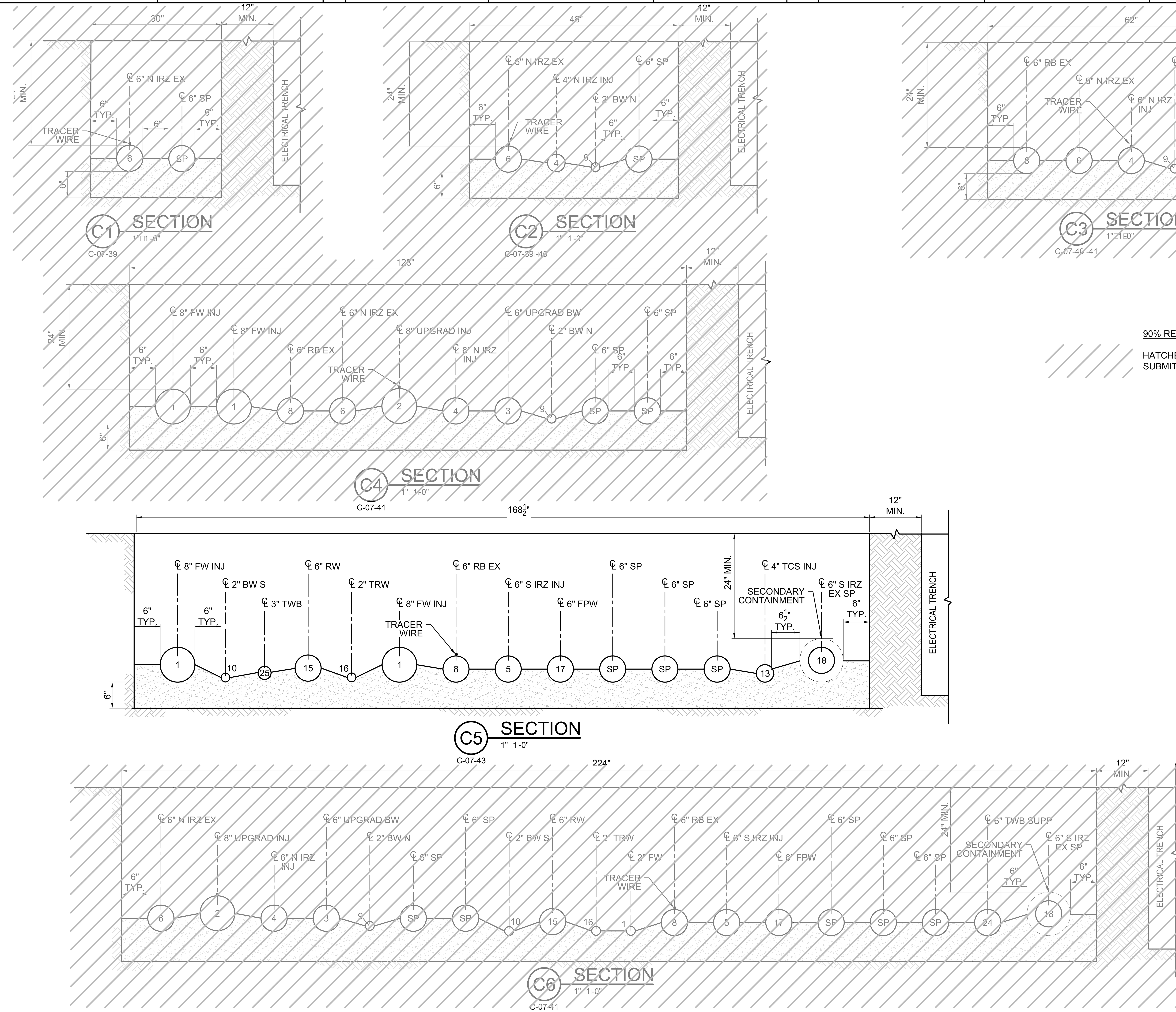
NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY	JEF
SO	
SUPV	JPB
DSGN	BAS
DWN	AJW
CHKD	JPB
OK	JEF
DATE	09/08/14
SCALES	1" = 20'

TOPOCK GROUNDWATER REMEDIATION PROJECT
PIPELINE - PLAN AND PROFILE
PIPELINE "F"
STA 10+00 TO STA 16+11
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
C-07-52	REV 0



90% RESPONSE TO COMMENTS NOTES:

HATCHED SELECTIONS NOT UPDATED FOR THIS SUBMITTAL. TO BE UPDATED FOR 100% SUBMITTAL.

PIPE ID	SERVICE
1	FRESH WATER INJECTION LOOP
2	UPGRADIENT INJECTION
3	UPGRADIENT BACKWASH
4	NORTH IRZ INJECTION (1-22)
5	SOUTH IRZ INJECTION (24-40)
6	NORTHERN IRZ EXTRACTION
7	IRZ-23 EXTRACTION
8	RIVERBANK EXTRACTION
9	BACKWASH NORTH
10	BACKWASH SOUTH
11	EAST RAVINE EXTRACTION WELL NETWORK HEADER
12	NOT USED
13	TCS INJECTION
14	TCS BACKWASH
15	REMEDY WASTEWATER
16	TREATED WATER
17	FIRE PROTECTION WATER
18	SOUTH IRZ EXTRACTION SPARE
19	EAST RAVINE ER-6 EXTRACTION
20	480V POWER CONDUIT
21	COMMUNICATIONS CONDUIT
22	12 V POWER
23	2/0 BARE COPPER GROUND
24	NOT USED
25	TWB EXTRACTION WELL NETWORK HEADER
CA	CARBON AMENDED WATER
PO	POTABLE WATER
SP	SPARE PIPE
SP( )	SPARE ELECTRICAL CONDUIT

NOTES:

1. SAND SHALL BE USED FROM THE BASE OF THE TRENCH TO 6 INCHES ABOVE THE TOP OF PIPES. SOILS FROM THE TRENCH EXCAVATION SHALL BE MOISTURE CONDITIONED AND USED AS BACKFILL. COMPACT TO 95% RELATIVE COMPACTION TO 12 INCHES BELOW GRADE. FOUR INCHES OF AS-CLASS 2 MATERIAL SHALL BE PLACED ON TOP OF THE COMPACTED SOIL FOLLOWED BY 4 INCHES OF AB-CLASS 2. THE ROADBASE SHALL BE TOPPED WITH A 2-INCH BASE COURSE LAYER AND CAPPED WITH A 2-INCH HMA PG 70-10 SURFACE COURSE.
2. PIPE SUPPORTS AND CLEANOUTS NOT SHOWN FOR CLARITY.
3. ALL COVERS SHALL BE TRAFFIC RATED.
4. CASING SPACERS NOT SHOWN FOR CLARITY.
5. PIPE BEDDING SHALL EXTEND HALF WAY UP THE PIPES PER THE SPECIFICATIONS.

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY — SO; SUPV; DSGN BAS; DWN; CHKD; OK; DATE; SCALES 1" = 1'-0"

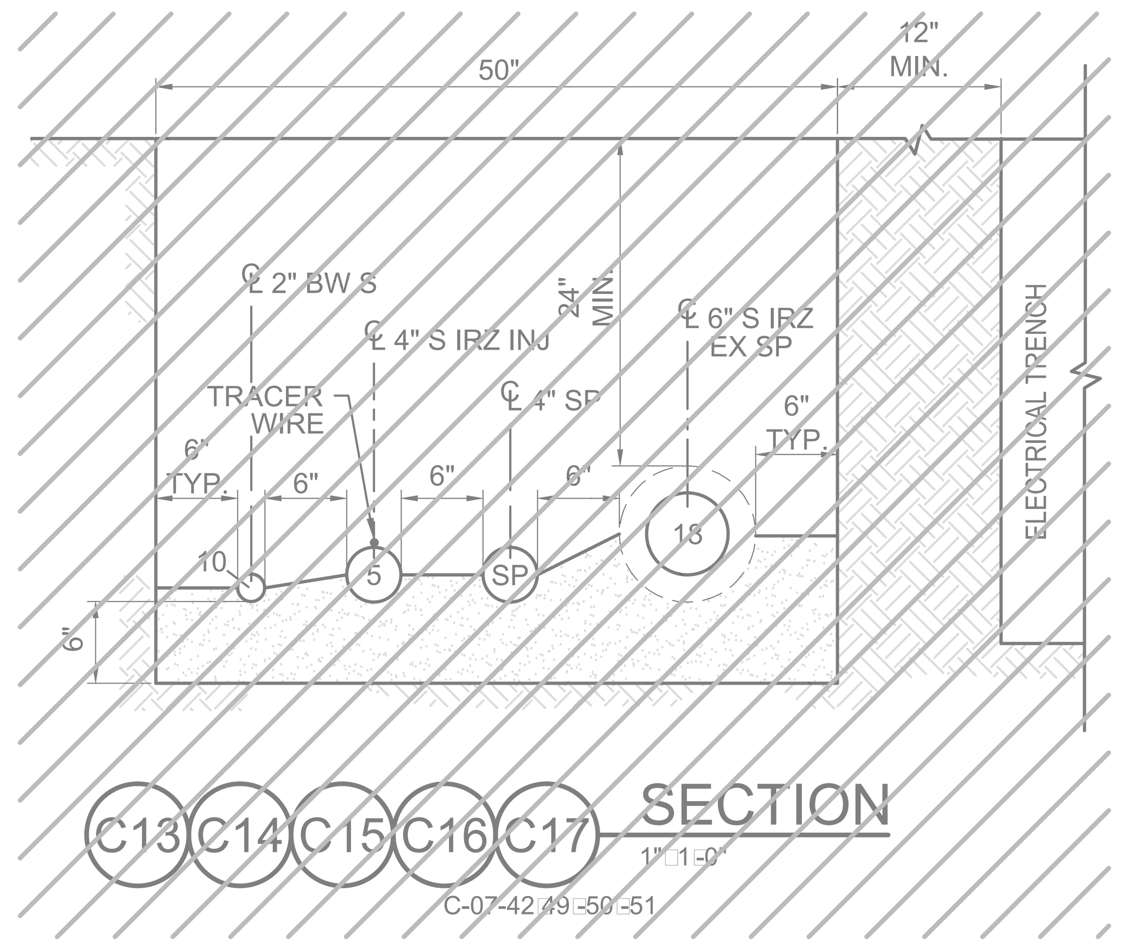
TOPOCK GROUNDWATER REMEDIATION PROJECT

TRENCH SECTIONS

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM; BILL OF MATL; DWG LIST; SUPSDS; SUPSD BY; SHEET NO. of SHEETS

C-07-108 REV 2



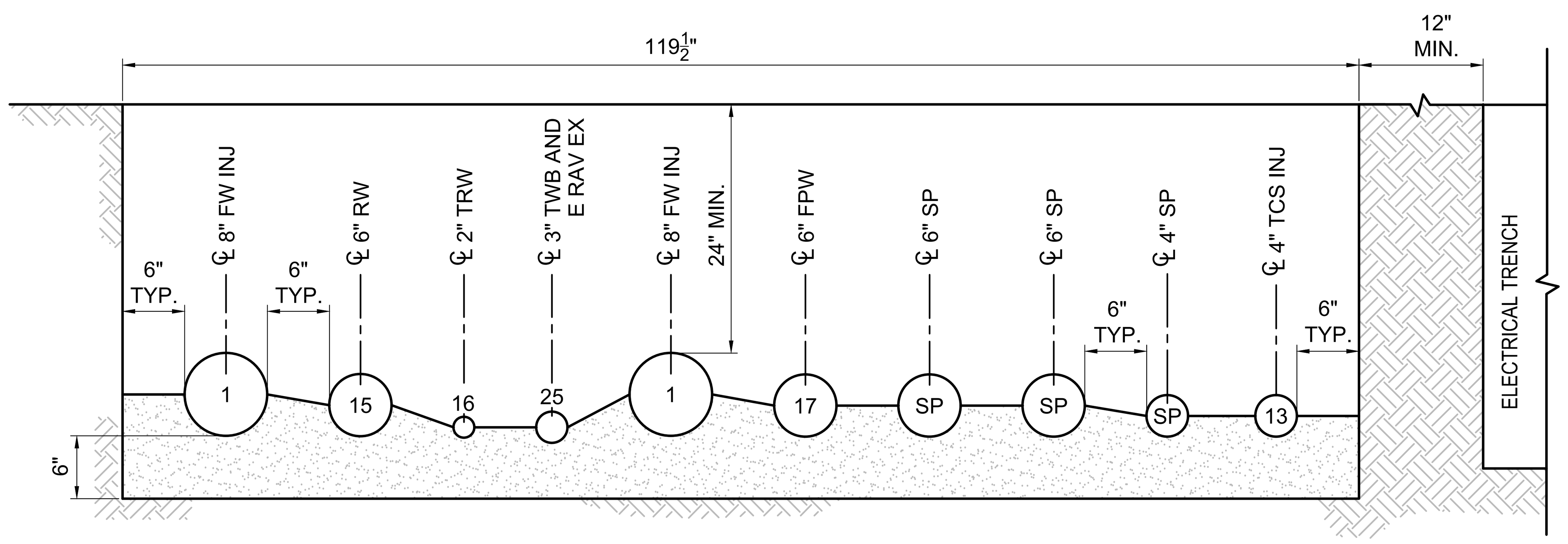
C13 C14 C15 C16 C17 SECTION

C-07-42, 49, 50, 51

90% RESPONSE TO COMMENTS NOTES:

HATCHED SELECTIONS NOT UPDATED FOR THIS SUBMITTAL. TO BE UPDATED FOR 100% SUBMITTAL.

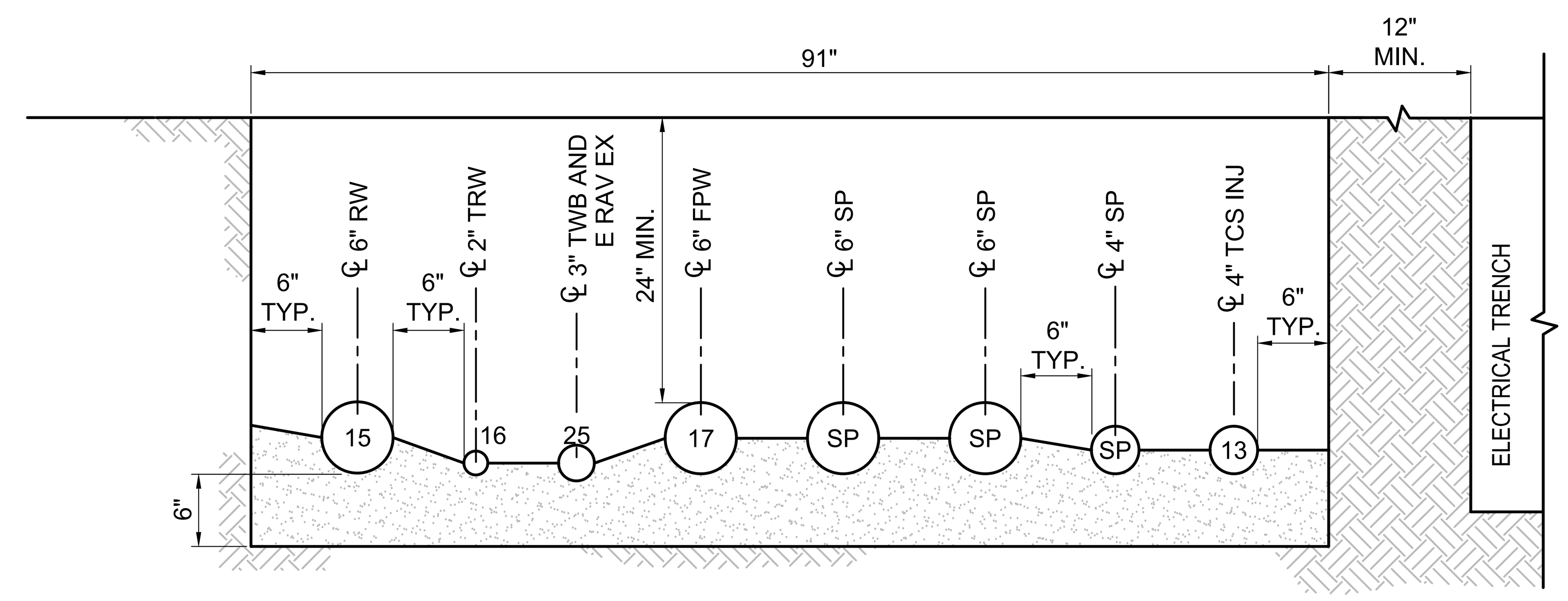
PIPE ID	SERVICE
1	FRESH WATER INJECTION LOOP
2	UPGRADIENT INJECTION
3	UPGRADIENT BACKWASH
4	NORTH IRZ INJECTION (1-22)
5	SOUTH IRZ INJECTION (24-40)
6	NORTHERN IRZ EXTRACTION
7	IRZ-23 EXTRACTION
8	RIVERBANK EXTRACTION
9	BACKWASH NORTH
10	BACKWASH SOUTH
11	EAST RAVINE EXTRACTION WELL NETWORK HEADER
12	NOT USED
13	TCS INJECTION
14	TCS BACKWASH
15	REMEDY WASTEWATER
16	TREATED WATER
17	FIRE PROTECTION WATER
18	SOUTH IRZ EXTRACTION SPARE
19	EAST RAVINE ER-6 EXTRACTION
20	480V POWER CONDUIT
21	COMMUNICATIONS CONDUIT
22	120V POWER
23	2/0 BARE COPPER GROUND
24	NOT USED
25	TWB EXTRACTION WELL NETWORK HEADER
CA	CARBON AMENDED WATER
PO	POTABLE WATER
SP	SPARE PIPE
SP(E)	SPARE ELECTRICAL CONDUIT



F1 SECTION

1"=1'-0"

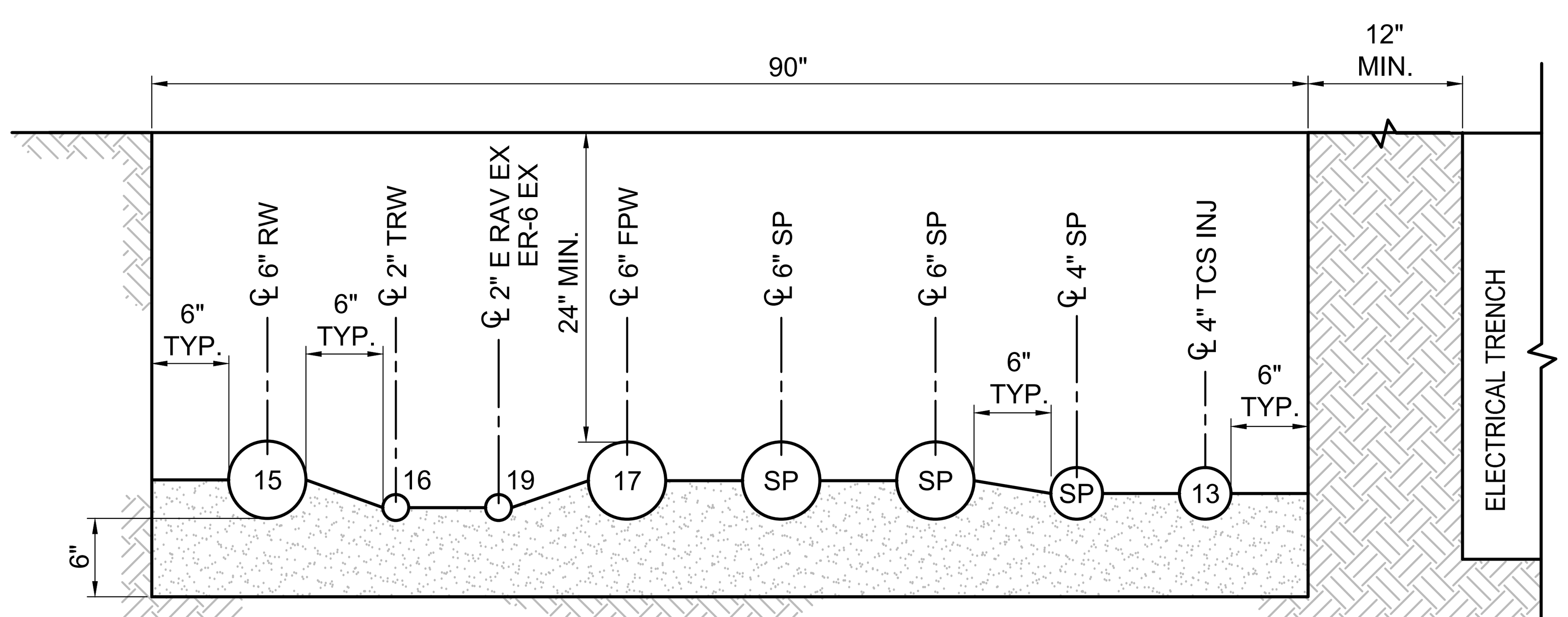
C-07-52



F2 SECTION

1"=1'-0"

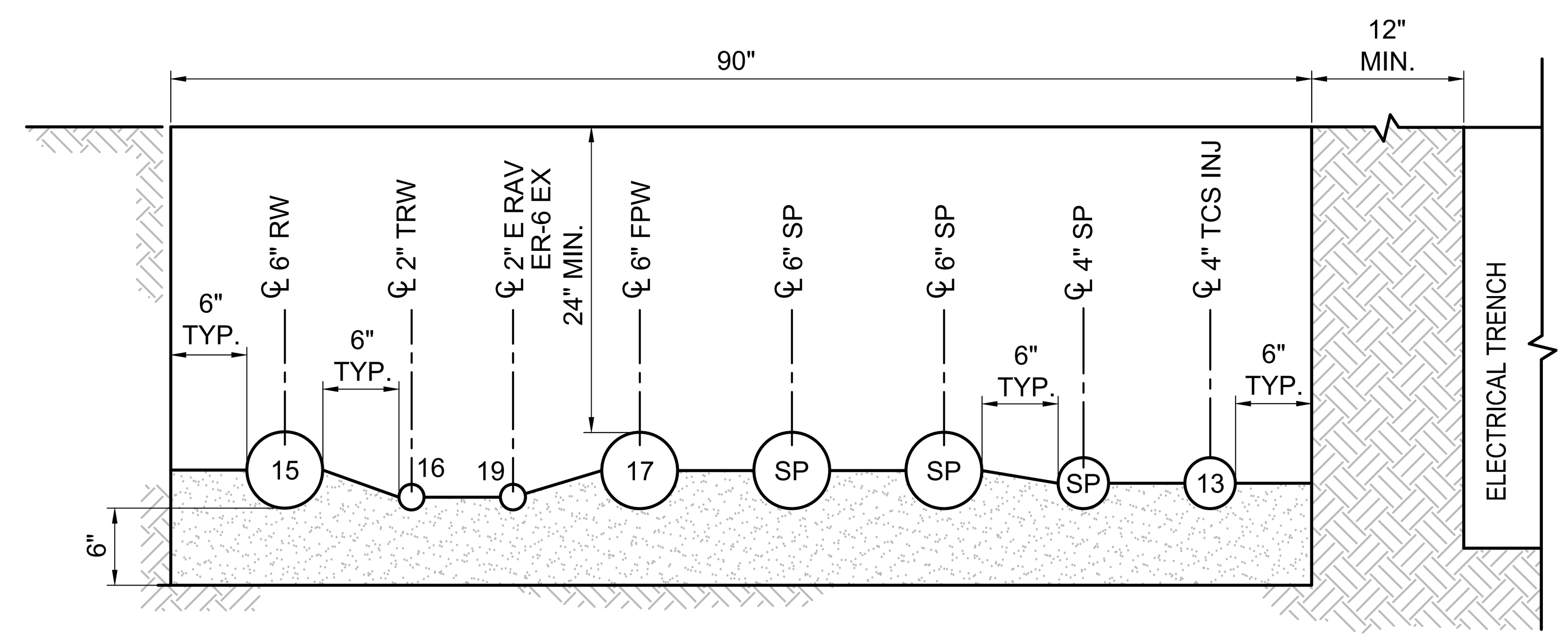
C-07-52



F3 SECTION

1"=1'-0"

C-07-52, 53



F4 SECTION

1"=1'-0"

C-07-52, 53

NOTES:

1. SAND SHALL BE USED FROM THE BASE OF THE TRENCH TO 6 INCHES ABOVE THE TOP OF PIPES. SOILS FROM THE TRENCH EXCAVATION SHALL BE MOISTURE CONDITIONED AND USED AS BACKFILL. COMPACT TO 95% RELATIVE COMPACTION TO 12 INCHES BELOW GRADE. FOUR INCHES OF AS-CLASS 2 MATERIAL SHALL BE PLACED ON TOP OF THE COMPACTED SOIL FOLLOWED BY 4 INCHES OF AB-CLASS 2. THE ROADBASE SHALL BE TOPPED WITH A 2-INCH BASE COURSE LAYER AND CAPPED WITH A 2-INCH HMA PG 70-10 SURFACE COURSE.
2. PIPE SUPPORTS AND CLEANOUTS NOT SHOWN FOR CLARITY.
3. ALL COVERS SHALL BE TRAFFIC RATED.
4. PIPE BEDDING SHALL EXTEND HALF WAY UP THE PIPES PER THE SPECIFICATIONS.

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	KLD, BAS, KLD	WLM	BJW

REVISIONS

APPROVED BY	SO
	SUPV
	DSGN BAS
	DWN
	CHKD
	OK
	DATE
	SCALES 1"=1'-0"

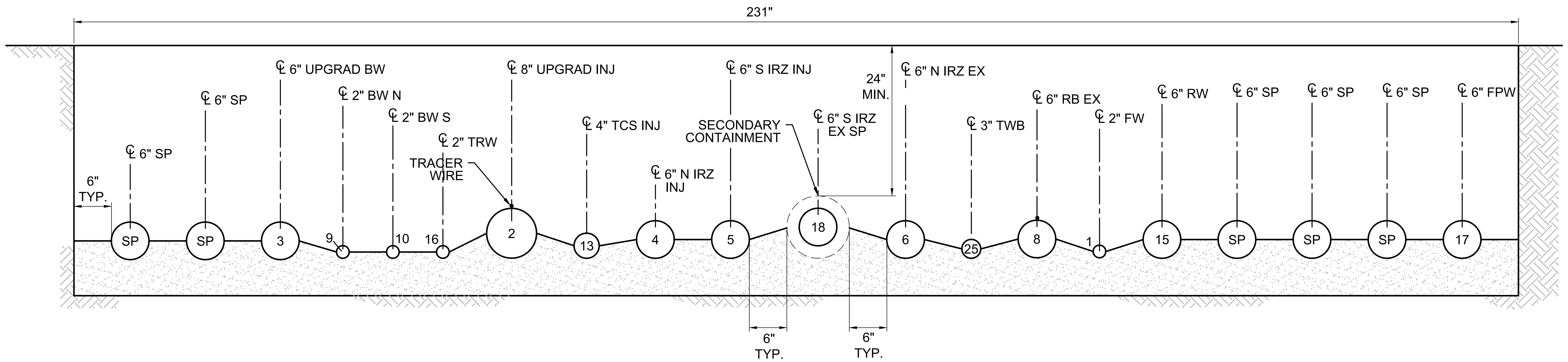
TOPOCK GROUNDWATER REMEDIATION PROJECT

TRENCH SECTIONS

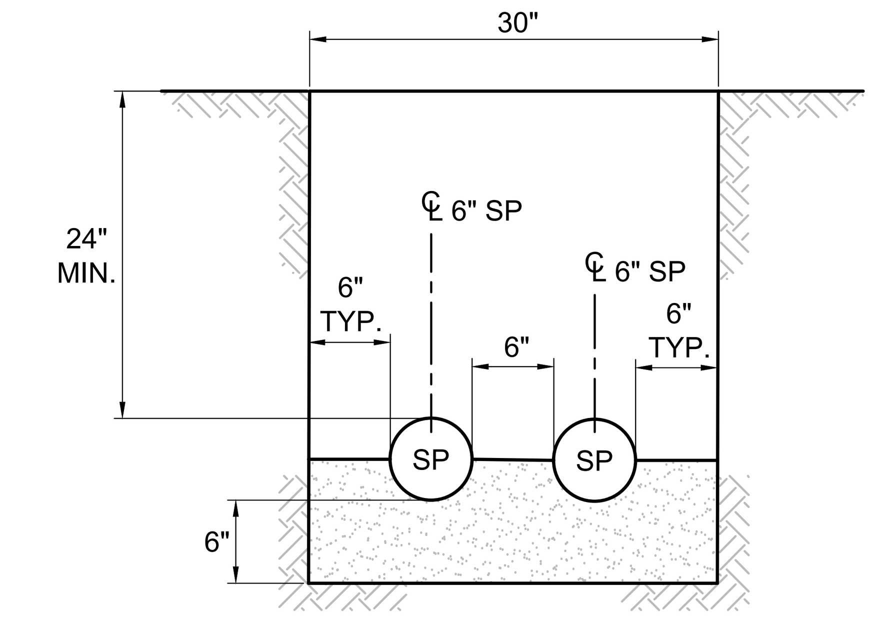
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-07-110 REV 2

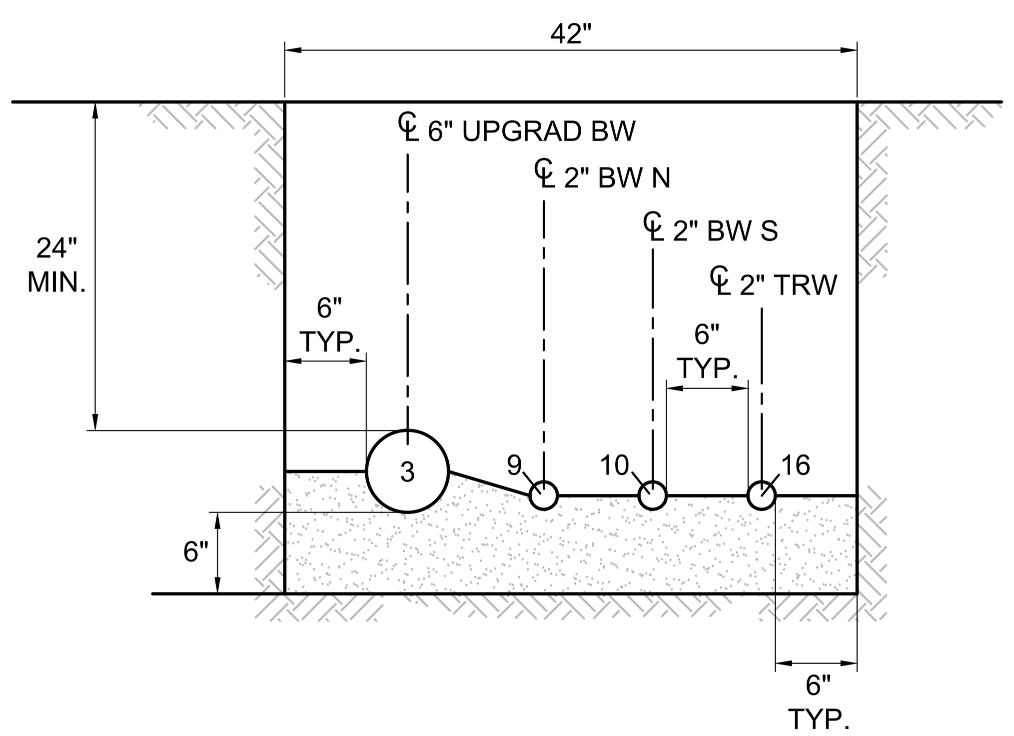
08/05/2015, 11:05, G:\Graphics\AR\TOPOCK-01\Submittal_100%\DWGs\C-Civil\C-07-108 to 122_PipeTrenchDetails.dwg, Tab: C-07-110



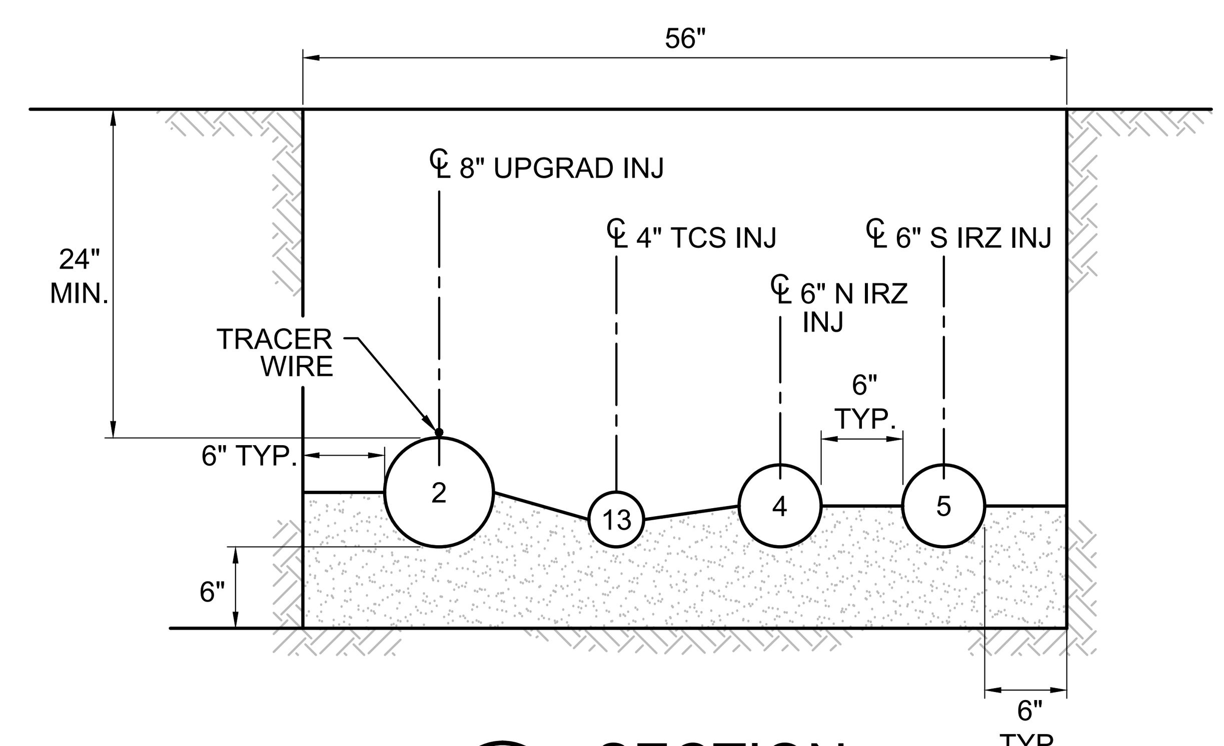
CA SECTION
1"=1'-0"
C-07-41



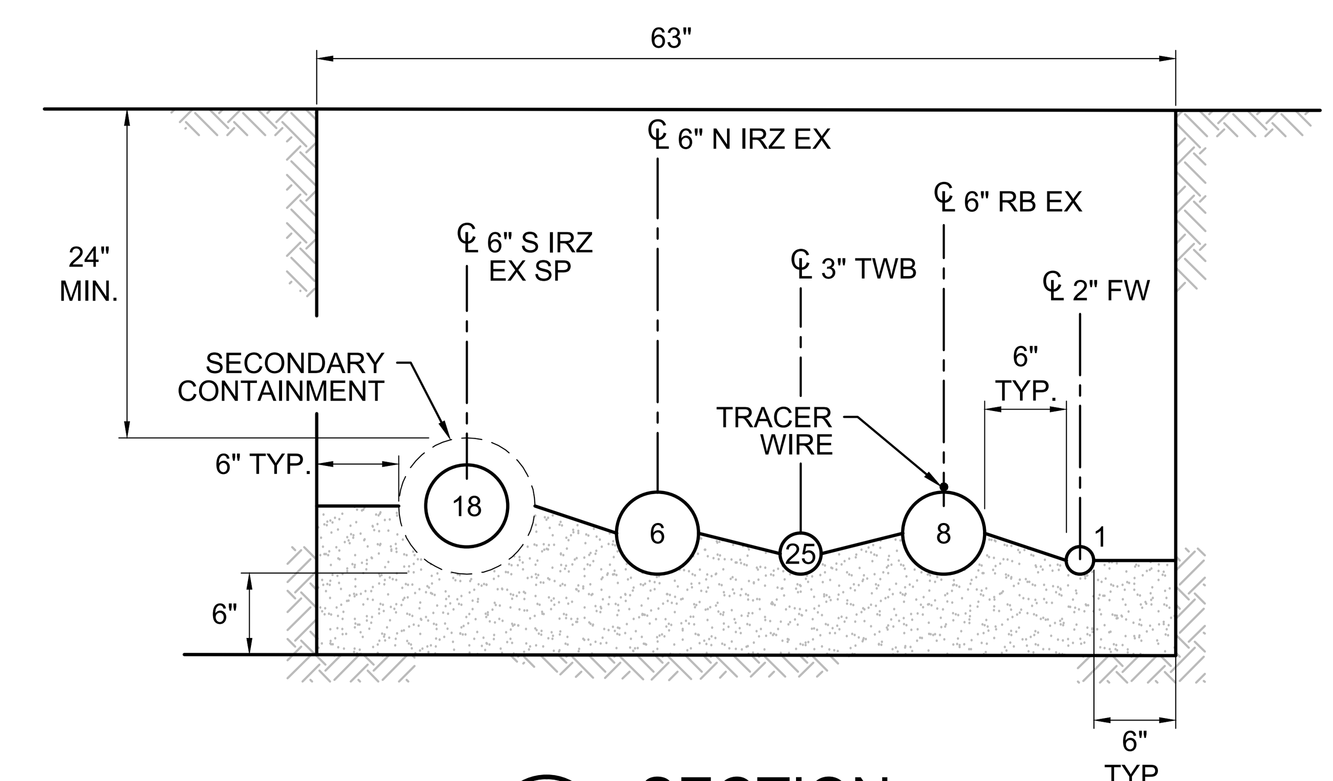
CB SECTION
1"=1'-0"
C-07-39



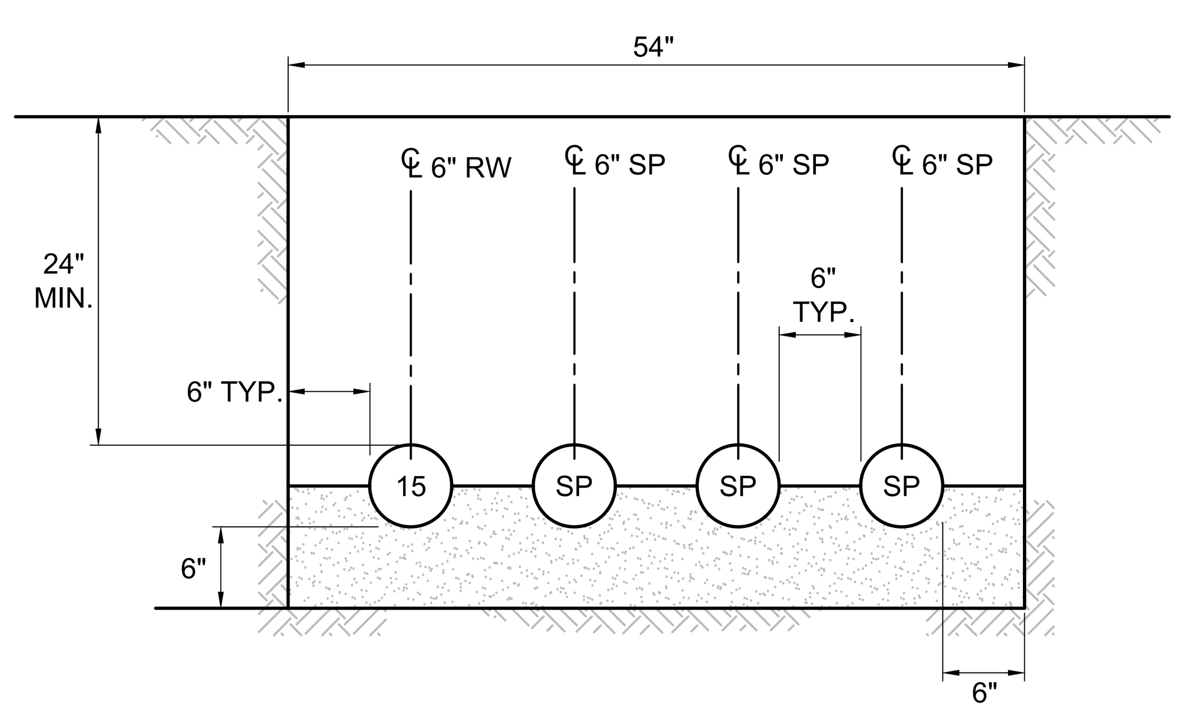
CC SECTION
1"=1'-0"
C-07-39/40



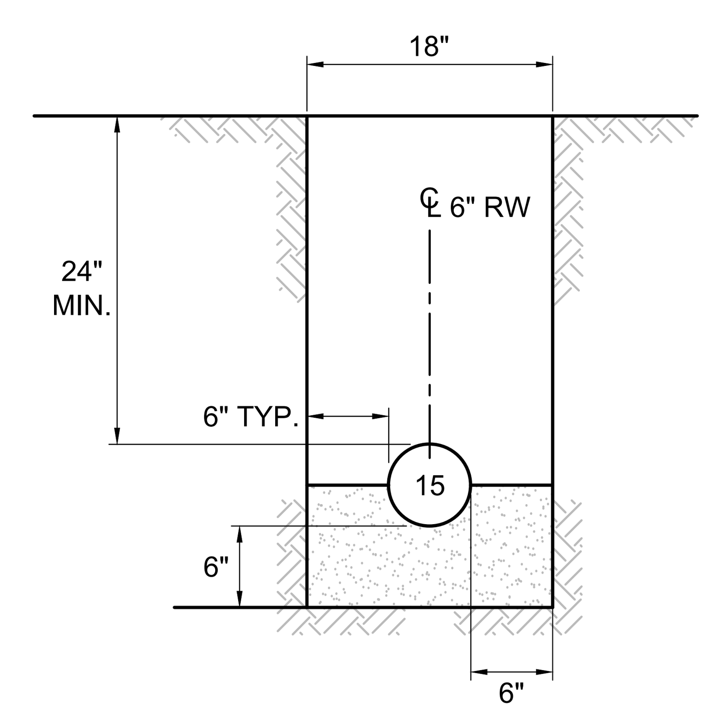
CD SECTION
1"=1'-0"
C-07-39/40



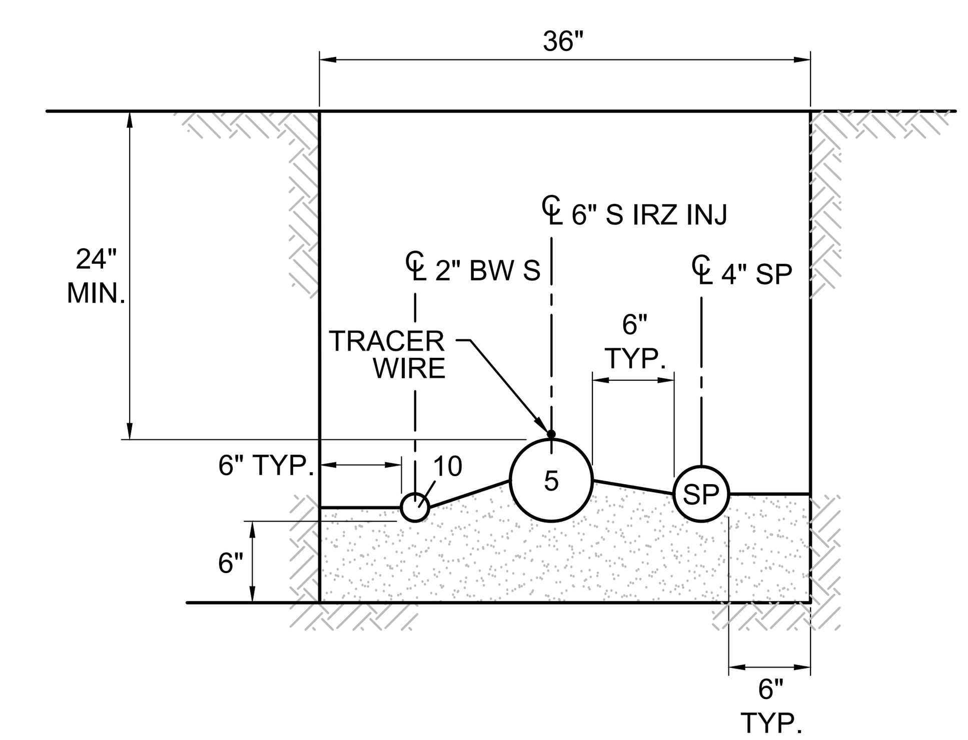
CE SECTION
1"=1'-0"
C-07-39/40



CF SECTION
1"=1'-0"
C-07-39/40



CG SECTION
1"=1'-0"
C-07-39/40



CH SECTION
1"=1'-0"
C-07-39/40

PIPE ID	SERVICE
1	FRESH WATER INJECTION LOOP
2	UPGRADIENT INJECTION
3	UPGRADIENT BACKWASH
4	NORTH IRZ INJECTION (1-22)
5	SOUTH IRZ INJECTION (24-40)
6	NORTHERN IRZ EXTRACTION
7	IRZ-23 EXTRACTION
8	RIVERBANK EXTRACTION
9	BACKWASH NORTH
10	BACKWASH SOUTH
11	EAST RAVINE EXTRACTION WELL NETWORK HEADER
12	NORTHEAST OF TCS EXTRACTION WELL NETWORK HEADER
13	TCS INJECTION
14	TCS BACKWASH
15	REMEDY WASTEWATER
16	TREATED WATER
17	FIRE PROTECTION WATER
18	SOUTH IRZ EXTRACTION SPARE
19	EAST RAVINE ER-6 EXTRACTION
20	480V POWER CONDUIT
21	COMMUNICATIONS CONDUIT
22	120V POWER
23	#2/0 BARE COPPER GROUND
24	TWB SUPPLEMENTAL FLOW
25	TWB EXTRACTION WELL NETWORK HEADER
CA	CARBON AMENDED WATER
PO	POTABLE WATER
SP	SPARE PIPE
SP(E)	SPARE ELECTRICAL CONDUIT

NOTES:

1. SAND SHALL BE USED FROM THE BASE OF THE TRENCH TO 6 INCHES ABOVE THE TOP OF PIPES. SOILS FROM THE TRENCH EXCAVATION SHALL BE MOISTURE CONDITIONED AND USED AS BACKFILL. COMPACT TO 95% RELATIVE COMPACTION TO 12 INCHES BELOW GRADE. FOUR INCHES OF AS-CLASS 2 MATERIAL SHALL BE PLACED ON TOP OF THE COMPACTED SOIL FOLLOWED BY 4 INCHES OF AB-CLASS 2. THE ROADBASE SHALL BE TOPPED WITH A 2-INCH BASE COURSE LAYER AND CAPPED WITH A 2-INCH HMA PG 70-10 SURFACE COURSE.
2. PIPE SUPPORTS AND CLEANOUTS NOT SHOWN FOR CLARITY.
3. ALL COVERS SHALL BE TRAFFIC RATED.
4. CASING SPACERS NOT SHOWN FOR CLARITY.
5. PIPE BEDDING SHALL EXTEND HALF WAY UP THE PIPES PER THE SPECIFICATIONS.

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
1	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW
0	09/08/14	PRE-FINAL (90%) DESIGN		AJW	BAS	JPB	JEF

REVISIONS

APPROVED BY: JEF
SO
SUPV JPB
DSGN BAS
DWN AJW
CHKD JPB
OK JEF
DATE 09/08/14
SCALES 1"=1'-0"

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH AREA
TRENCH SECTIONS
SHEET 1 OF 2
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-07-127
REV 1

N1808

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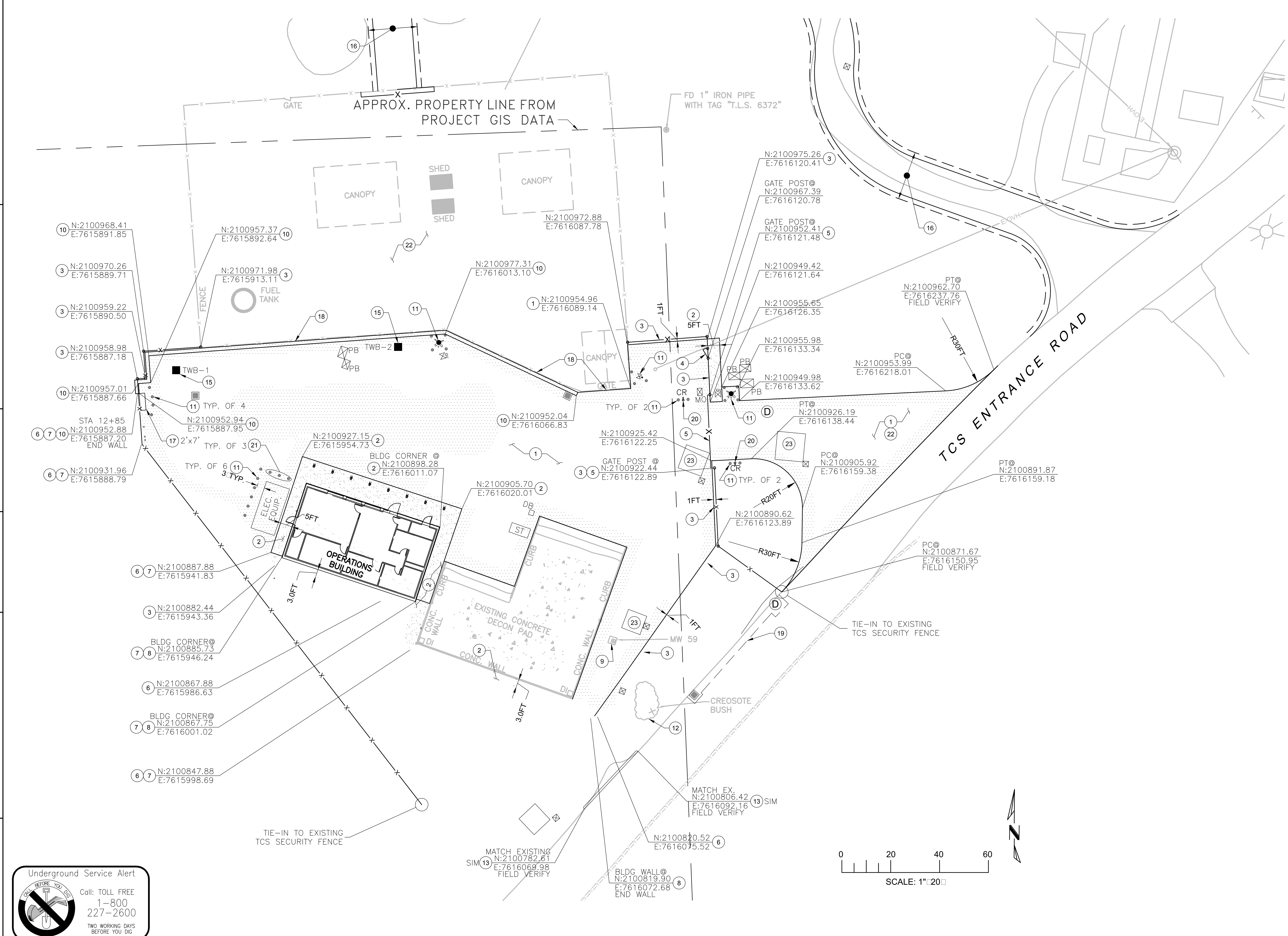


Underground Service Alert
Call: TOLL FREE
1-800
227-2600
TWO WORKING DAYS
BEFORE YOU DIG

GENERAL NOTES:

A SEE LEGEND, NOTES & ABBREVIATIONS C-08-00 FOR COMPLETE GENERAL NOTES.
B ALL PERIMETER FENCE AND GATE SHALL MEET PG&E PROPERTY FENCE AND GATE STANDARD L-50.

KEYED NOTES:

1 INSTALL ASPHALT PAVEMENT. SEE DETAIL 1/C-08-06.
2 INSTALL CONCRETE SIDEWALK. SEE DETAIL 4/C-08-06.
3 INSTALL 8FT HIGH CHAIN LINK FENCE. SEE DRAWING C-00-06 AND C-00-07.
4 INSTALL PG&E STANDARD PERSONNEL GATE AS MANUFACTURED BY SGS.
5 INSTALL 30FT SLIDE GATE. SEE DRAWING C-00-06 AND C-00-07.
6 INSTALL 8' HIGH CHAIN LINK FENCE ON WALL. SEE DETAIL S-08-09 ON STRUCTURAL PLANS.
7 CONSTRUCT RETAINING WALL. (COORDINATES ARE TO BACK FACE OF WALL). SEE PROFILE C-08-10 AND DETAILS S-08-04 AND S-08-09 ON STRUCTURAL PLANS.
8 SEE STRUCTURAL FOR CONNECTION TO BUILDING WALL.
9 ADJUST EX. WELL TO FINISHED GRADE. COORDINATE FINAL CONDITION WITH PG&E.
10 INSTALL THICKEN EDGE. SEE DETAIL 2/C-08-06.
11 INSTALL BOLLARDS. SEE DETAILS 5/C-08-06.
12 PROTECT EX. CREOSOTE BUSH.
13 INSTALL CURB. SEE DETAIL 3/C-08-06.
14 REFER TO STRUCTURAL DRAWING S-08-09 FOR CONCRETE AND COLUMN INTERFACE.
15 CONFIRM WELL LOCATIONS WITH ARCADIS DRAWING C-07-36.
16 FOR NEW ACCESS ROAD 30% LAYOUT, SEE DRAWING C-08-11.
17 AREA RESERVED FOR ELECTRICAL EQUIPMENT. SEE ELECTRICAL DRAWING E-08-01.
18 PROTECT EXISTING FENCE AND GATES.
19 REINSTATE ASPHALT PAVEMENT AND CURB. MATCH EXISTING CONDITIONS.
20 INSTALL HI-LO CARD READER FOR MAIN GATE AND ASSOCIATED EQUIPMENT. SEE PG&E DRAWINGS S1016, 406169, S1036 THRU 38. COORDINATE ELEC. CONDUITS AND EQUIP. WITH ELEC. DRAWINGS.
21 INSTALL REMOVABLE BOLLARD. SEE DETAIL 8/C-08-06.
22 ACCESS TO TRANSWESTERN GAS METERING STATION YARD MUST BE MAINTAINED AT ALL TIMES.
23 TRENCH F VAULT LOCATION BY ARCADIS SEE DWG C-07-52

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

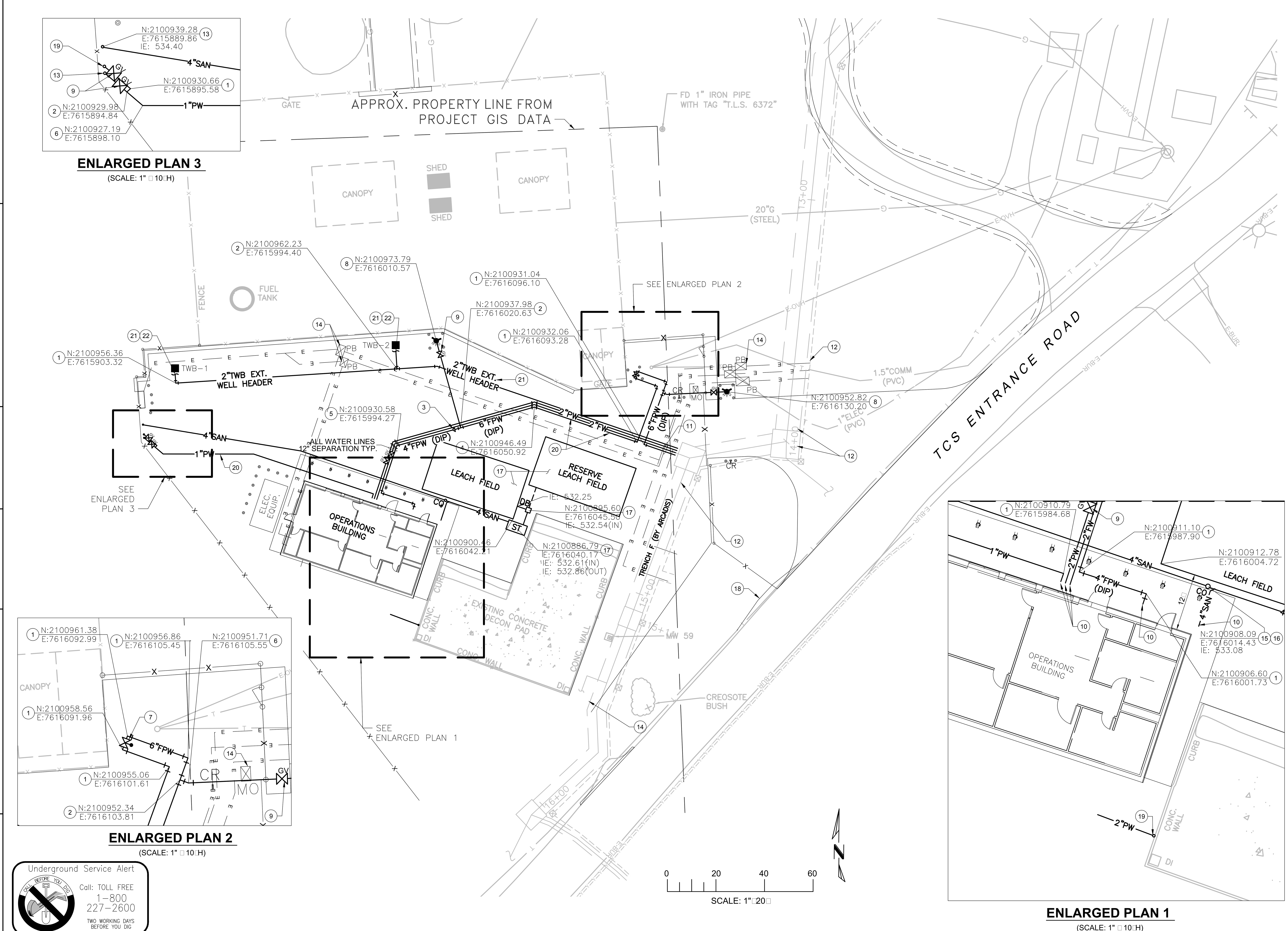
REVISIONS

APPROVED BY	
SO	
SUPV	
DSGN	DA
DWN	DA
CHKD	HO
OK	
DATE	09/08/14
SCALES	1"=20

TOPOCK GROUNDWATER REMEDIATION PROJECT
TRANSWESTERN BENCH
SITE IMPROVEMENTS
PLAN
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-08-02 REV 0

H1808



GENERAL NOTES:

A SEE LEGEND, NOTES & ABBREVIATIONS C-08-00 FOR COMPLETE GENERAL NOTES.
B THE USE OF MECHANICAL RESTRAINTS IS RECOMMENDED BASED ON UNKNOWN SITE SOIL CHARACTERISTICS. THRUST BLOCK INSTALLATION IS BASED ON INSTALLING THRUST BLOCKS AGAINST UNDISTURBED SITE SOILS. CONTRACTOR IS RESPONSIBLE FOR ADEQUATE THRUST RESTRAINTS ON ALL PRESSURE LINES TO BE INSTALLED. THRUST RESTRAINT SYSTEMS SHALL BE SUBMITTED AND APPROVED BY ENGINEER.
C FOR UTILITY CROSSINGS, SEE DETAILS 4,7/C-08-07.

KEYED NOTES:

1. INSTALL 90° BEND. SEE PLAN FOR ASSOCIATED SIZE.
2. INSTALL TEE. SEE PLAN FOR ASSOCIATED SIZE.
3. INSTALL REDUCER. SEE PLAN FOR ASSOCIATED SIZE.
4. INSTALL 22.5° BEND AND 11.25° FOR TOTAL BEND OF 33.75°. SEE PLAN FOR ASSOCIATED SIZE.
5. INSTALL 45° BEND AND 11.25° FOR TOTAL BEND OF 56.25°. SEE PLAN FOR ASSOCIATED SIZE.
6. INSTALL 22.5° BEND. SEE PLAN FOR ASSOCIATED SIZE.
7. INSTALL POST INDICATOR VALVE. SEE DETAIL 2/C-08-07.
8. INSTALL FIRE HYDRANT. SEE DETAIL 12/C-08-07.
9. INSTALL GATE VALVE AND VALVE BOX. SEE DETAIL 3/C-08-07.
10. INSTALL BUILDING UTILITY PIPE CONNECTION. SEE 6/C-08-07. COORDINATE LOCATION WITH PLUMBING DRAWING P-08-01.
11. APPROXIMATE CONNECTION TO TRENCH F PENDING FINAL DESIGN BY ARCADIS, SEE DWG C-07-52 AND DETAIL 10/C-07-117. COORDINATE FIELD ADJUSTMENT AS NEEDED WITH ARCADIS.
12. VAULTS AND ALIGNMENT OF TRENCH F BY ARCADIS, SEE DWG C-07-52
13. CAP SERVICE AT 6" ABOVE FINISHED GRADE.
14. APPROX. PULL BOX LOCATION. COORDINATE LOCATION PER ELECTRICAL DRAWING E-08-01.
15. INSTALL CLEANOUT. SEE DETAIL 9/C-08-08.
16. INSTALL WYE CONNECTION. SEE PLAN FOR ASSOCIATED SIZE.
17. FOR SEPTIC SYSTEM DESIGN SEE DRAWING C-08-20.
18. REROUTE EX. TELECOM SERVICE. PROVIDE 12" MIN. HORIZONTAL AND VERTICAL CLEARANCE. COORDINATE RELOCATION WITH FRONTIER
19. INSTALL HOSE BIB. SEE DETAIL 1/C-08-08.
20. FOR PIPE MATERIAL OF WATER DISTRIBUTION LINES 2" DIAMETER OR LESS, SEE PLUMBING SPEC. SECTION 22 10 01.
21. EXTEND WATER SERVICE TO WELLS. COORDINATE WELL LOCATION WITH ARCADIS DRAWING C-07-36.
22. FOR ELECTRICAL SERVICE ROUTING TO WELL, SEE ELECTRICAL DRAWING E-08-01.
23. INSTALL 45° BEND. SEE PLAN FOR ASSOCIATED SIZE.

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING
ARCADIS

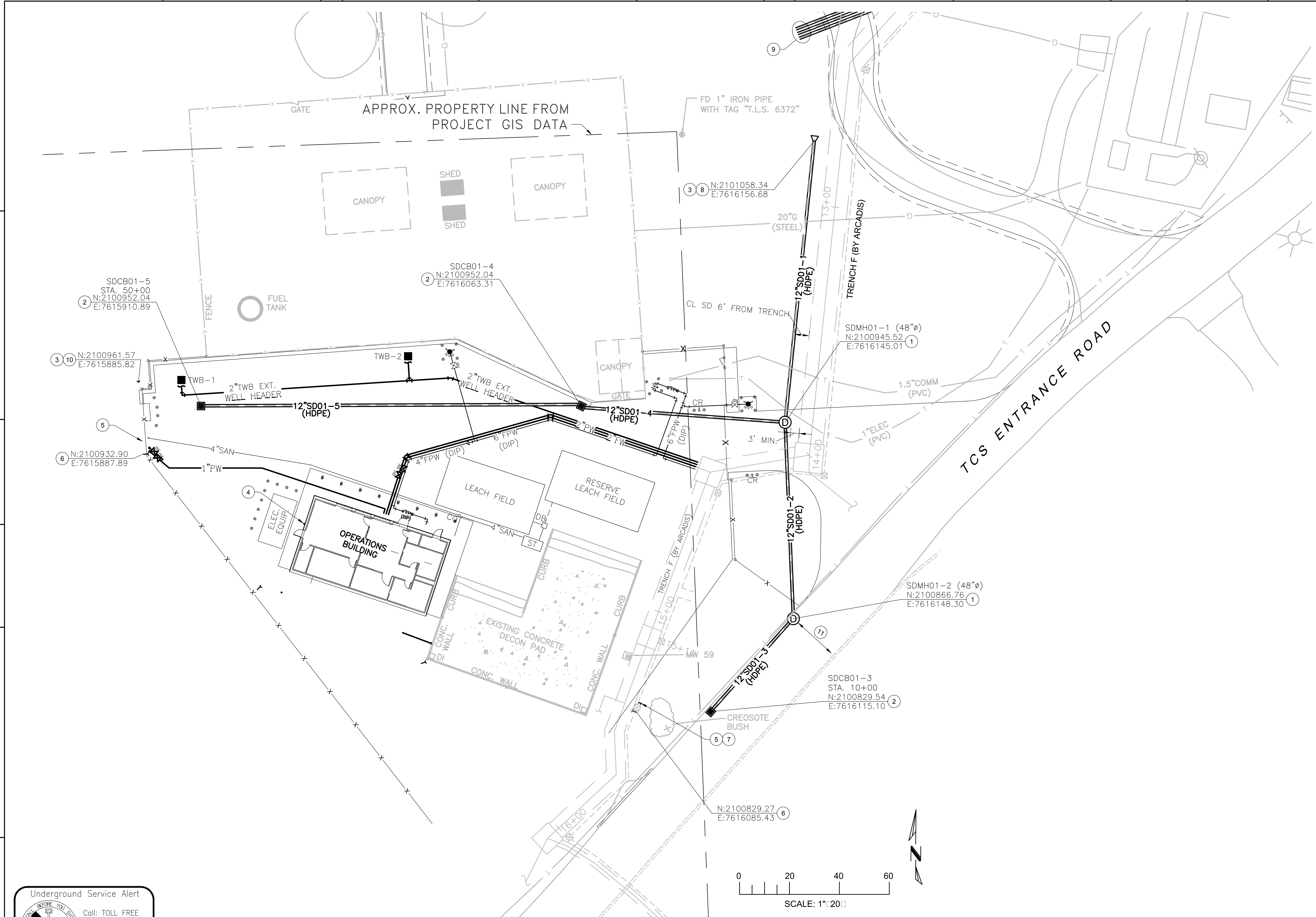
NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY	SO
SUPV	
DSGN	DA
DWN	DA
CHKD	HO
OK	
DATE	09/08/14
SCALES	1" = 20'

TOPOCK GROUNDWATER REMEDIATION PROJECT
TRANSWESTERN BENCH SITE UTILITIES PLAN
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
C-08-03 REV 0



GENERAL NOTES:

A SEE LEGEND, NOTES & ABBREVIATIONS C-08-00 FOR COMPLETE GENERAL NOTES.

KEYED NOTES:

1. INSTALL MANHOLE. SEE DETAILS 2,3,4/C-08-08.
2. INSTALL 2"X2" CONC. CB AND GRATE SIMILAR TO MODEL CB-2424 AS MANUFACTURED BY OLD CASTLE.
3. INSTALL 18" THICK RIPRAP APRON (D50=12") OVER GEOTEXTILE FABRIC (MODEL 140N BY MIRAFI OR EQUIVALENT). SEE CALTRANS STANDARD DETAIL SS-10 (SIM) EXTEND MIN. 12" VERTICALLY ABOVE CROWN.
4. INSTALL ROOF DRAIN. KEEP ON NORTH FACE OF WALL. (DO NOT CROSS CONNECT WITH WALL DRAIN.)
5. INSTALL WALL DRAIN PER STRUCTURAL DETAIL 5/S-08-09 AND RETAINING WALL PROFILE DRAWING C-08-10. USE 6" ADS RIGID PERFORATED PIPE SURROUNDED WITH 3/4" MINUS DRAIN ROCK AND WRAPPED WITH GEOTEXTILE FABRIC (MODEL 140N BY MIRAFI OR EQUIVALENT) OVERLAPPED 6" MIN.
6. WEEP HOLE THROUGH WALL SEE STRUCTURAL DETAIL S-08-09.
7. INSTALL TERMINAL RISER. SEE CALTRANS STANDARD DETAIL D102 (SIM).
8. INSTALL FLARED END SECTION. SEE CALTRANS STANDARD DETAIL D94A.
9. FOR NEW ACCESS ROAD 30% LAYOUT, SEE DRAWING C-08-11.
10. DAYLIGHT WALL DRAIN ONTO SLOPE AND ENSURE DISCHARGE HAS A FREE DRAINING PATH.
11. AT MINIMUM ONE LANE MUST REMAIN OPEN AT ALL TIMES.

Underground Service Alert
Call: TOLL FREE
1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

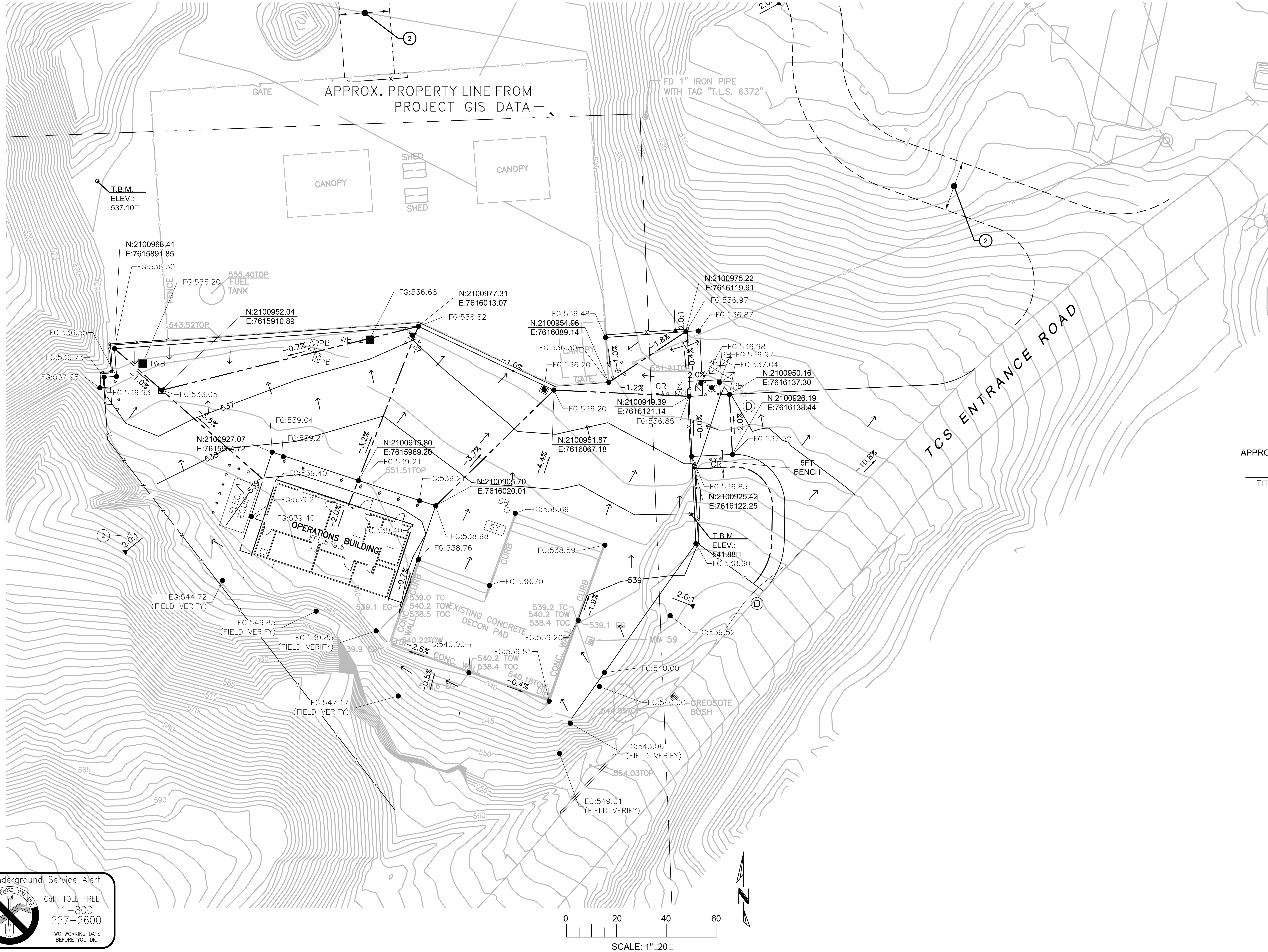
APPROVED BY		
SO		
SUPV		
DSGN		DA
DWN		DA
CHKD		HO
OK		
DATE		09/08/14
SCALES		1"=20'

TOPOCK GROUNDWATER REMEDIATION PROJECT

TRANSWESTERN BENCH STORM DRAINAGE PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
C-08-04	REV 0



Underground Service Alert
Call: TOLL FREE
1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

GENERAL NOTES:

A SEE LEGEND, NOTES & ABBREVIATIONS C-08-00 FOR COMPLETE GENERAL NOTES.

KEYED NOTES:

1 SEE DRAWING C-08-11 FOR NEW ACCESS ROAD 30% LAYOUT.
2 ALL SLOPES SHALL NOT BE ANY STEEPER THAN 2:1 (H:V)

APPROXIMATE EARTHWORK VOLUMES - TRANSWESTERN BENCH AREA
COMPARING FINISHED AND EXISTING SURFACES

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	28527	839	211	628 C

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		AJW	KLD	WLM	BJW

REVISIONS

APPROVED BY	
SO	
SUPV	
DSGN	DA
DWN	DA
CHKD	HO
OK	
DATE	09/08/14
SCALES	1" = 20'

TOPOCK GROUNDWATER REMEDIATION PROJECT

TRANSWESTERN BENCH SITE GRADING PLAN

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
C-08-05	REV 0

08/05/2015 11:16 G: Gra s AR TOPOCK-01 S. bm al 100% DWGs C-C C-08-05.d g Tab: C-08-05

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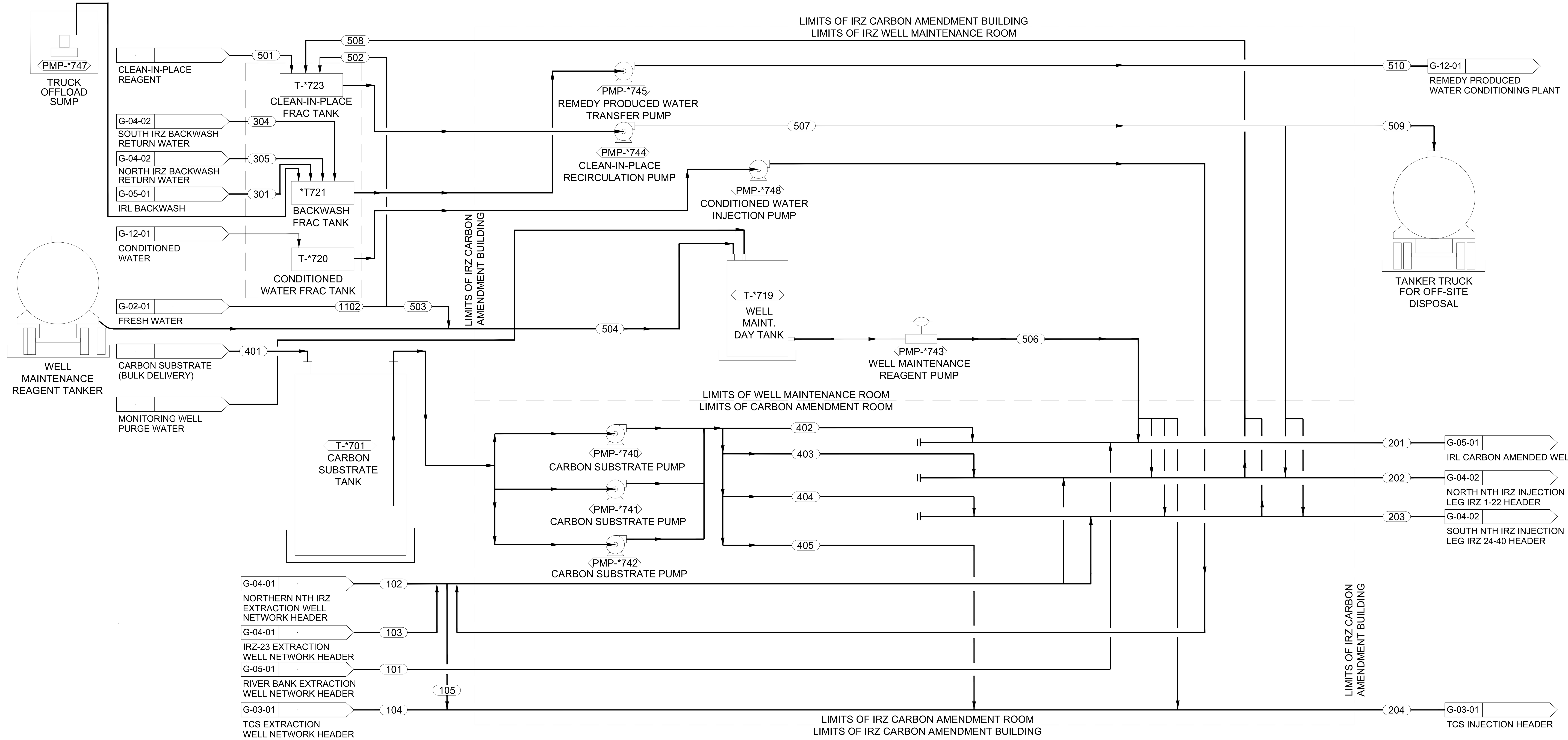

NOTES:

1. SPARE HEADERS AND FUTURE PROVISIONAL WELLS ARE NOT SHOWN.

ABBREVIATIONS:

BWGW: BACKWASH GROUNDWATER
CAGW: CARBON AMENDED GROUNDWATER
CIPR: CLEAN IN PLACE REAGENT
ETOH: ETHANOL
EXGW: EXTRACTED GROUNDWATER
FW: FRESH WATER
GPD: GALLONS PER DAY
GPM: GALLONS PER MINUTE
IRL: INNER RECIRCULATION LOOP
IRZ: IN-SITU REACTIVE ZONE
lbs/day POUNDS PER DAY
mg/L: MILLIGRAMS PER LITER
NTH: NATIONAL TRAIL HIGHWAY
TOC: TOTAL ORGANIC CARBON
TW: TREATED WATER
WMR: WELL MAINTENANCE REAGENT
µg/L: MICROGRAMS PER LITER

Design Basis and Mass Balance[a,g]

Stream ID:	101	102	103	104	105	201	202	203	204	209	301	304[i]	305[i]	401
Stream Description:	EXGW	EXGW	EXGW	EXGW	EXGW	CAGW/FW	CAGW	CAGW	CAGW	FW	BWGW	BWGW	BWGW	ETOH
Nominal Design Parameters														
Flow Rate (GPM):	150	200	100	27	TBD	150	300		24	TBD	≤400	17	20	---
Carbon Substrate[b,c] (GPD):	---	---	---	---	---	10	104		8.3	---	---	---	---	---
TOC[b,c] (mg/L):	---	---	---	---	---	20	100		100	---	---	---	---	---
Chromium[d] (µg/L):	10	26.3	2300	3203	---	---	---		---	---	---	---	---	---
Chromium[d] (lbs/day):	1.8E-02	6.3E-02	2.8E+00	1.00E+00	---	---	---		---	---	---	---	---	---
Maximum Design Parameters														
Flow Rate (GPM):	500[e]	400[f]		39	TBD	750[h]	400[f]		75	---	≤400	35	40	---
Carbon Substrate[b,c] (GPD):	---	---	---	---	---	104	694		130	---	---	---	---	j
TOC[b,c] (mg/L):	---	---	---	---	---	50	500		500	---	---	---	---	---
Chromium[d] (µg/L):	10	26	2,300	2981	---	---	---		---	---	---	---	---	---
Chromium[d] (lbs/day):	6.0E-02	3.7		1.00E+00	---	---	---		---	---	---	---	---	---

Stream ID:	402	403	404	405	1102	501	502	503	504	505	506	507	508	509	510	511
Stream Description:	ETOH	ETOH	ETOH	ETOH	FW	CIPR	FW	FW	FW	FW	WMR	WMR	WMR	WMR/BWGW	WMR/BWGW	MWPW
Nominal Design Parameters																
Flow Rate (GPM):	---	---	---	---	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Carbon Substrate[b,c] (GPD):	10	104	TBD	8.3	---	---	---	---	---	---	---	---	---	---	---	---
TOC[b,c] (mg/L):	20	100	TBD	100	---	---	---	---	---	---	---	---	---	---	---	---
Chromium[d] (µg/L):	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Chromium[d] (lbs/day):	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Maximum Design Parameters																
Flow Rate (GPM):	---	---	---	38	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Carbon Substrate[b,c] (GPD):	104	694	TBD	130	---	---	---	---	---	---	---	---	---	---	---	---
TOC[b,c] (mg/L):	50	500	TBD	500	---	---	---	---	---	---	---	---	---	---	---	---
Chromium[d] (µg/L):	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Chromium[d] (lbs/day):	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

a - Values represent target/estimated design parameters for initial operation; system operation may be modified to optimize system performance.
b - Denatured ethanol assumed; instantaneous dosage concentration will not exceed 1-percent by volume.
c - Average flow rate/concentration over time; carbon substrate dosing will be periodic and duration/frequency will vary.
d - Estimated initial concentration.
e - Total maximum River Bank extracted groundwater flow limited to 500 gpm.
f - Total maximum NTH IRZ extracted/injected groundwater flow limited to 400 gpm.
g - Reference: G-03-01, G-04-01, G-04-02.
h - Total maximum carbon-amended injection well flow limited to 750 gpm; may include freshwater (see G-05-01).
i - Total backwash return water volume per week from NTH IRZ injection will network is approximately 18,000 gallons.
j - Maximum delivered volume = 7,000 gallons.

- DRAFT -
NOT FOR CONSTRUCTION

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD	BY
2	8/5/15	90% RTC RESOLUTION		AJW	MSL	JPB	JEF	
				KLD	BJW			
				KLD	BJW			

REVISIONS

APPROVED BY: SO; SUPV; DSGN BJW; DWN KLD; CHKD; OK; DATE; SCALES NONE

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH
PROCESS FLOW DIAGRAM
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
G-06-01 REV 2

N1808

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NOTES
1. TAG NUMBER "*" IS A PLACEHOLDER FOR THE STATION SCADA ID. FOR THE IRZ CARBON AMENDMENT BUILDING THE LOCATION IS "IRZ00-". EXCHANGE "IRZ00-" FOR "*" TO COMPLETE TAG OR INSTRUMENT REFERENCE. REFER TO SHEET I-00-03 FOR A TABLE OF LOCATION IDS.
2. SEE SHEET I-00-03 FOR INTERLOCK TABLE.
3. CONTRACTOR TO PLACE CLEANOUTS LOW POINT DRAINS AND AIR RELIEF VALVES AT LOCATION SHOWN ON CIVIL SHEETS.
4. SIMILAR FOR EACH INTERVAL.

- DRAFT -
NOT FOR CONSTRUCTION

ARCADIS

REVISIONS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW	JPB	BJW	DC
				MS	MWM		
				MS	MWM		

APPROVED BY: SO; SUPV; DSGN MWM; DWN MS; CHKD; OK; DATE; SCALES NONE

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH CARBON AMENDMENT BUILDING P&ID
SHEET 1 OF 4
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM / BILL OF MATL / DWG LIST / SUPSDS / SUPSD BY
SHEET NO. I-06-01 of SHEETS
REV 2

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N1808

NOTES

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2. SEE SHEET I-00-03 FOR INTERLOCK TABLE.
3. CONTRACTOR TO PLACE CLEANOUTS, LOW POINT DRAINS AND AIR RELIEF VALVES AT LOCATION SHOWN ON CIVIL SHEETS.
4. SIMILAR FOR EACH INTERVAL.

- DRAFT -
NOT FOR
CONSTRUCTION

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
2	8/5/15	90% RTC RESOLUTION		AJW / MS / MS	JPB / MWM / MWM	BJW	DC

REVISIONS

APPROVED BY: SO / SUPV / DSGN MWM / DWN MS / CHKD / OK / DATE / SCALES NONE

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH CARBON AMENDMENT BUILDING P&ID
SHEET 2 OF 4
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM / BILL OF MATL / DWG LIST / SUPSDS / SUPSD BY / SHEET NO. of SHEETS

I-06-02 REV 2

N1808

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NOTES
1. TAG NUMBER "*" IS A PLACEHOLDER FOR THE STATION SCADA ID. FOR THE IRZ CARBON AMENDMENT BUILDING THE LOCATION IS "IRZ00-". EXCHANGE "IRZ00-" FOR "*" TO COMPLETE TAG OR INSTRUMENT REFERENCE. REFER TO SHEET I-00-03 FOR A TABLE OF LOCATION IDS.
2. SEE SHEET I-00-03 FOR INTERLOCK TABLE.
3. CONTRACTOR TO PLACE CLEANOUTS, LOW POINT DRAINS AND AIR RELIEF VALVES AT LOCATION SHOWN ON CIVIL SHEETS.
4. SIMILAR FOR EACH INTERVAL.

- DRAFT -
NOT FOR CONSTRUCTION

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD	BY
2	8/5/15	90% RTC RESOLUTION		AJW	JPB	BJW	DC	
				MS	MWM			
				MS	MWM			

REVISIONS

APPROVED BY	SO
	SUPV
	DSGN MWM
	DWN MS
	CHKD
	OK
	DATE
	SCALES NONE

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH CARBON AMENDMENT BUILDING P&ID
SHEET 3 OF 4
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
BILL OF MATL	
DWG LIST	
SUPSDS	
SUPSD BY	
SHEET NO. of SHEETS	
I-06-03	REV 2

N1808

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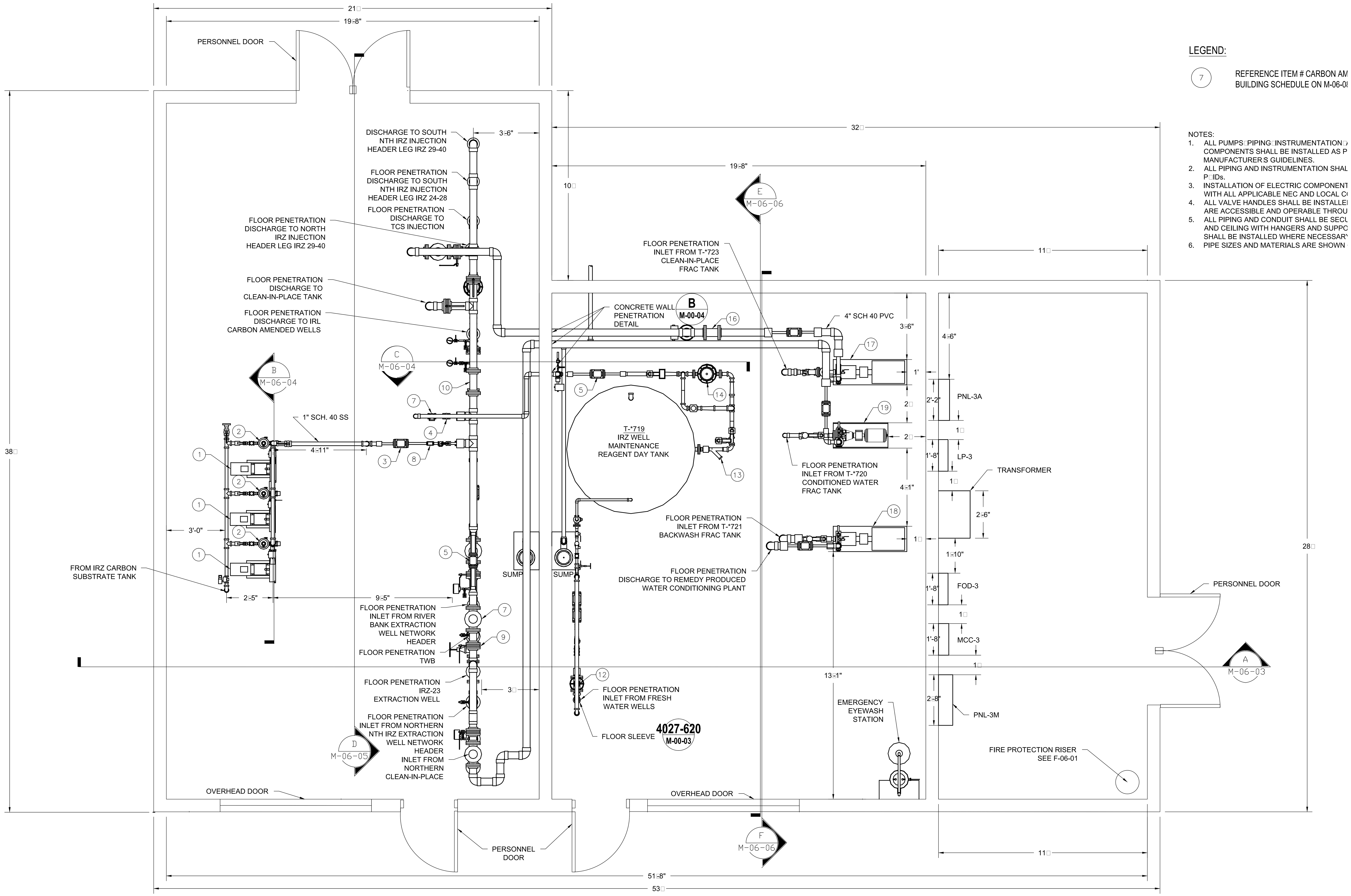

MW-20 BENCH CARBON AMENDMENT BUILDING MECHANICAL LAYOUT

3/8" □ 1-0"

LEGEND:

7 REFERENCE ITEM # CARBON AM BUILDING SCHEDULE ON M-06-0

NOTES:
1. ALL PUMPS□PIPING□INSTRUMENTATION COMPONENTS SHALL BE INSTALLED AS P MANUFACTURER□S GUIDELINES.
2. ALL PIPING AND INSTRUMENTATION SHAL P□IDs.
3. INSTALLATION OF ELECTRIC COMPONENT WITH ALL APPLICABLE NEC AND LOCAL C
4. ALL VALVE HANDLES SHALL BE INSTALLE ARE ACCESSIBLE AND OPERABLE THROU
5. ALL PIPING AND CONDUIT SHALL BE SECU AND CEILING WITH HANGERS AND SUPPO SHALL BE INSTALLED WHERE NECESSARY
6. PIPE SIZES AND MATERIALS ARE SHOWN

- DRAFT -
NOT FOR CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		LUK	JPB	KLD	BJW

REVISIONS

APPROVED BY: SO / SUPV / DSGN / DWN / CHKD / OK / DATE 8/5/15 / SCALES

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH CARBON AMENDMENT BUILDING MECHANICAL LAYOUT
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
M-06-01 REV 0

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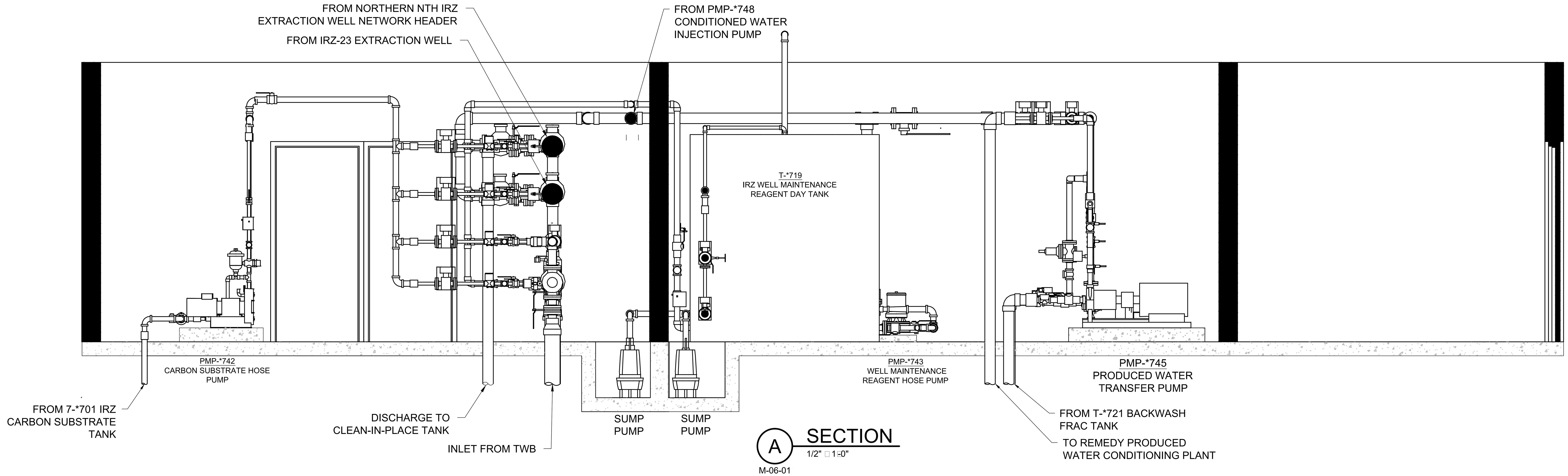
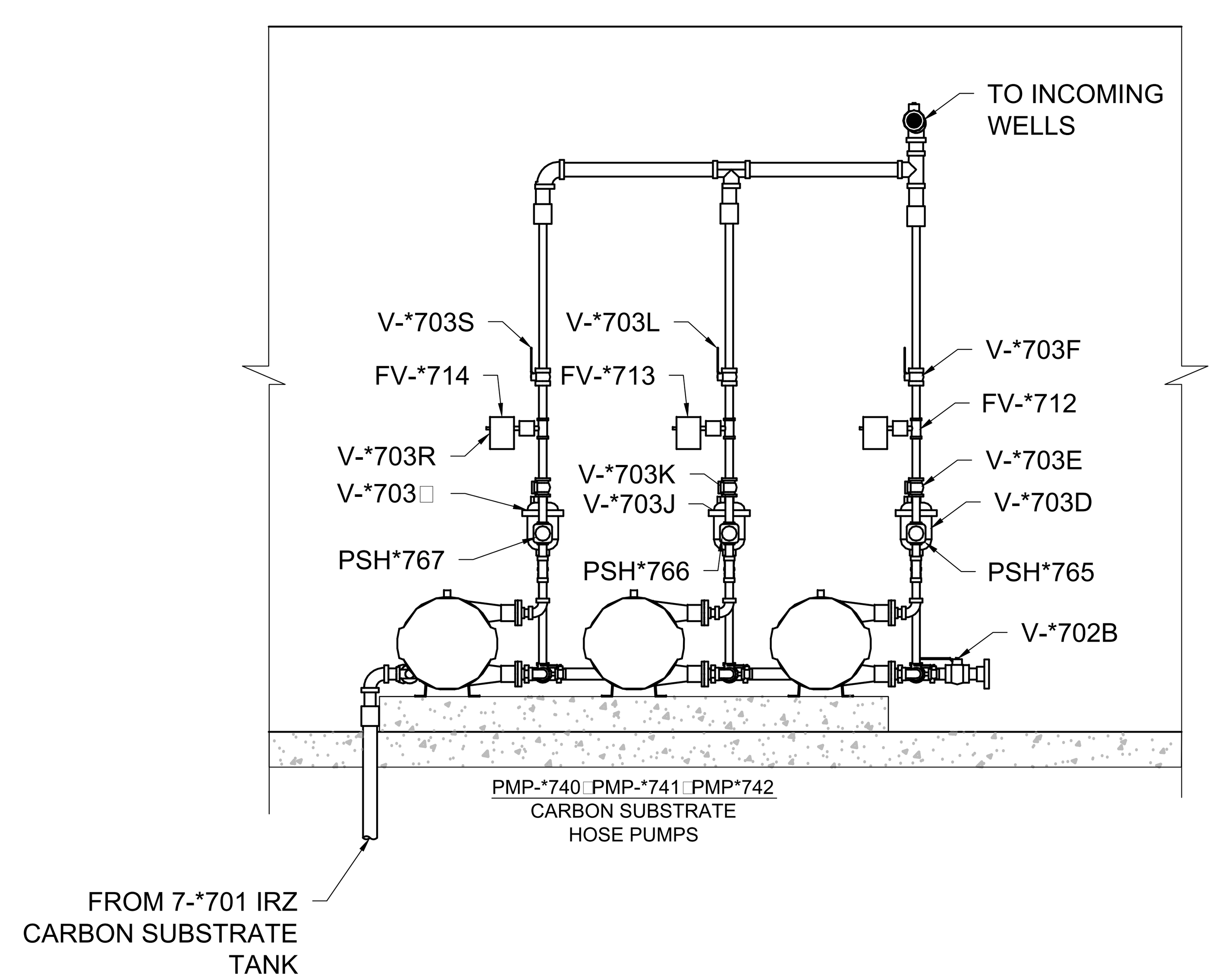
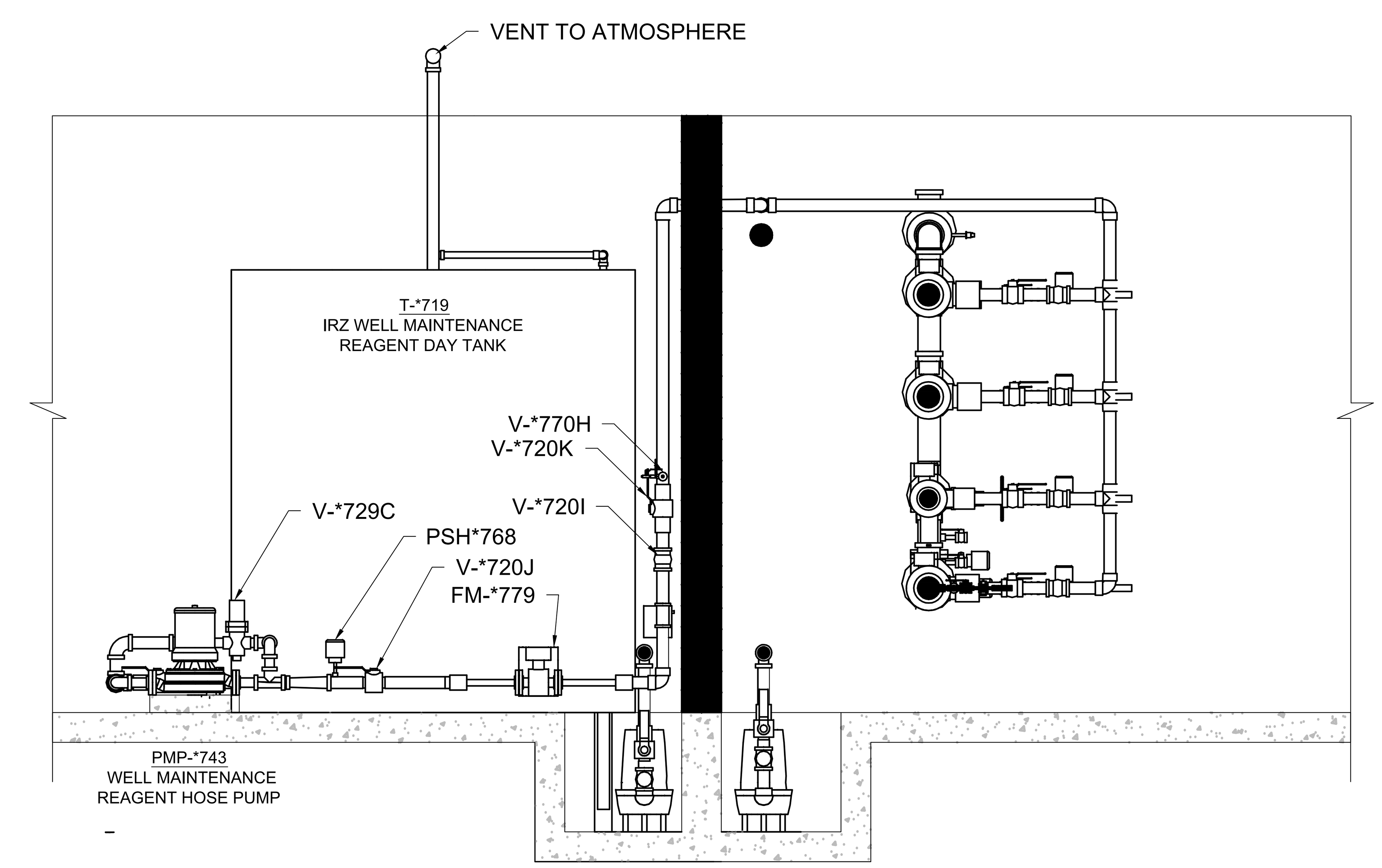


A SECTION
1/2" = 1'-0"
M-06-01



B SECTION
1/2" = 1'-0"
M-06-01



C SECTION
1/2" = 1'-0"
M-06-01

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

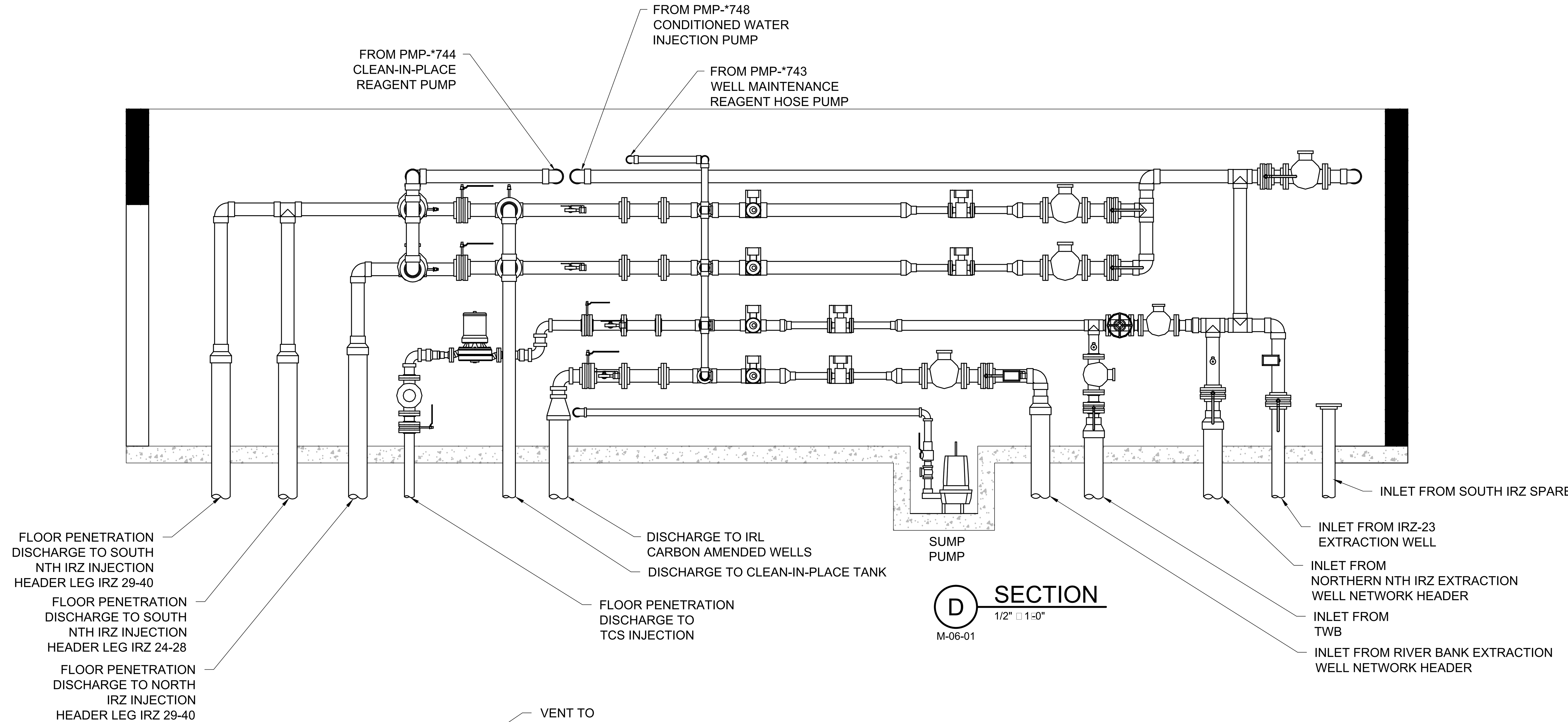
NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		LUK	JPB	KLD	BJW

REVISIONS

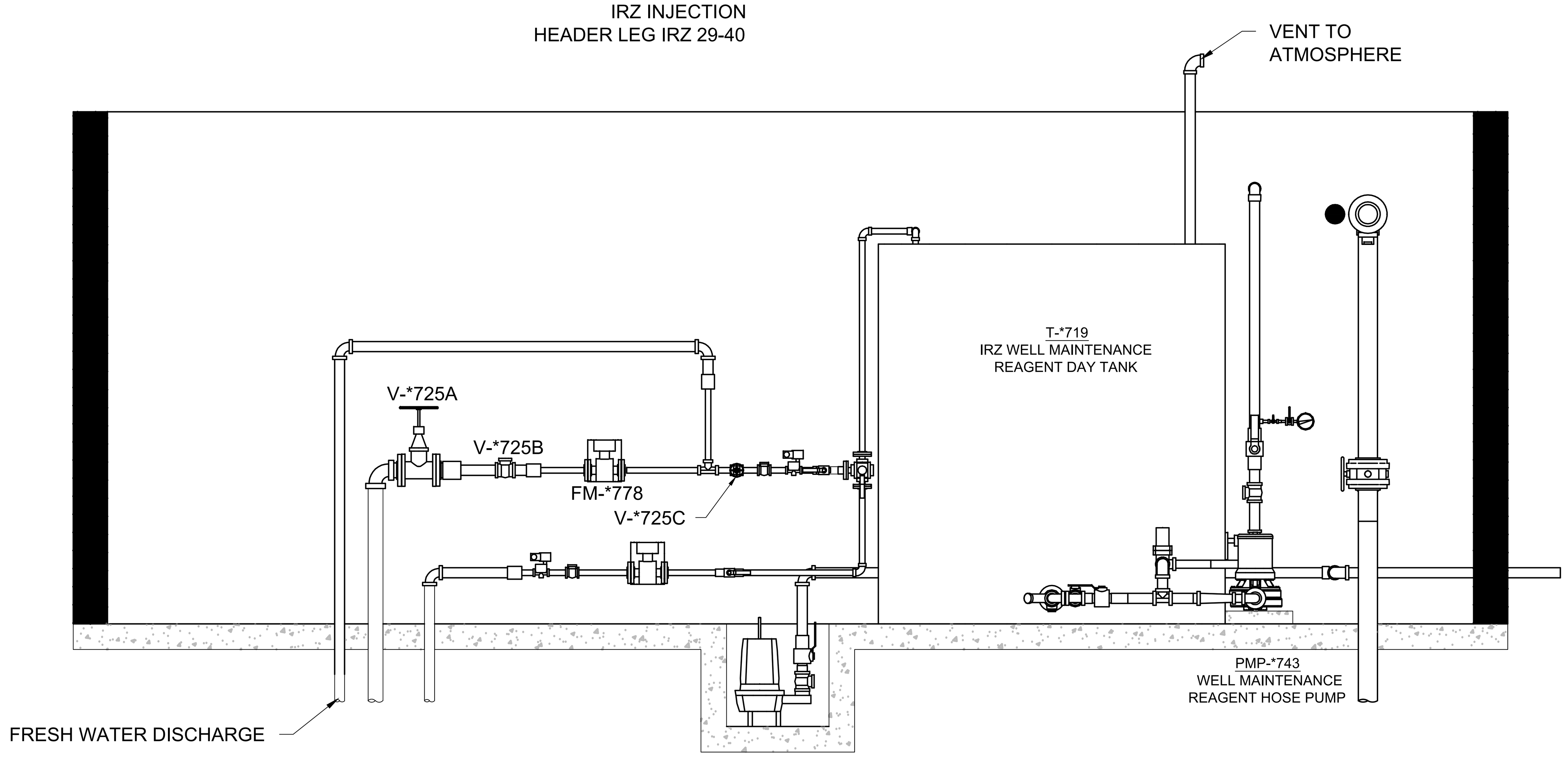
APPROVED BY: SO / SUPV / DSGN / DWN / CHKD / OK / DATE 8/5/15 / SCALES

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH CARBON AMENDMENT BUILDING
MECHANICAL LAYOUT SECTIONS
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

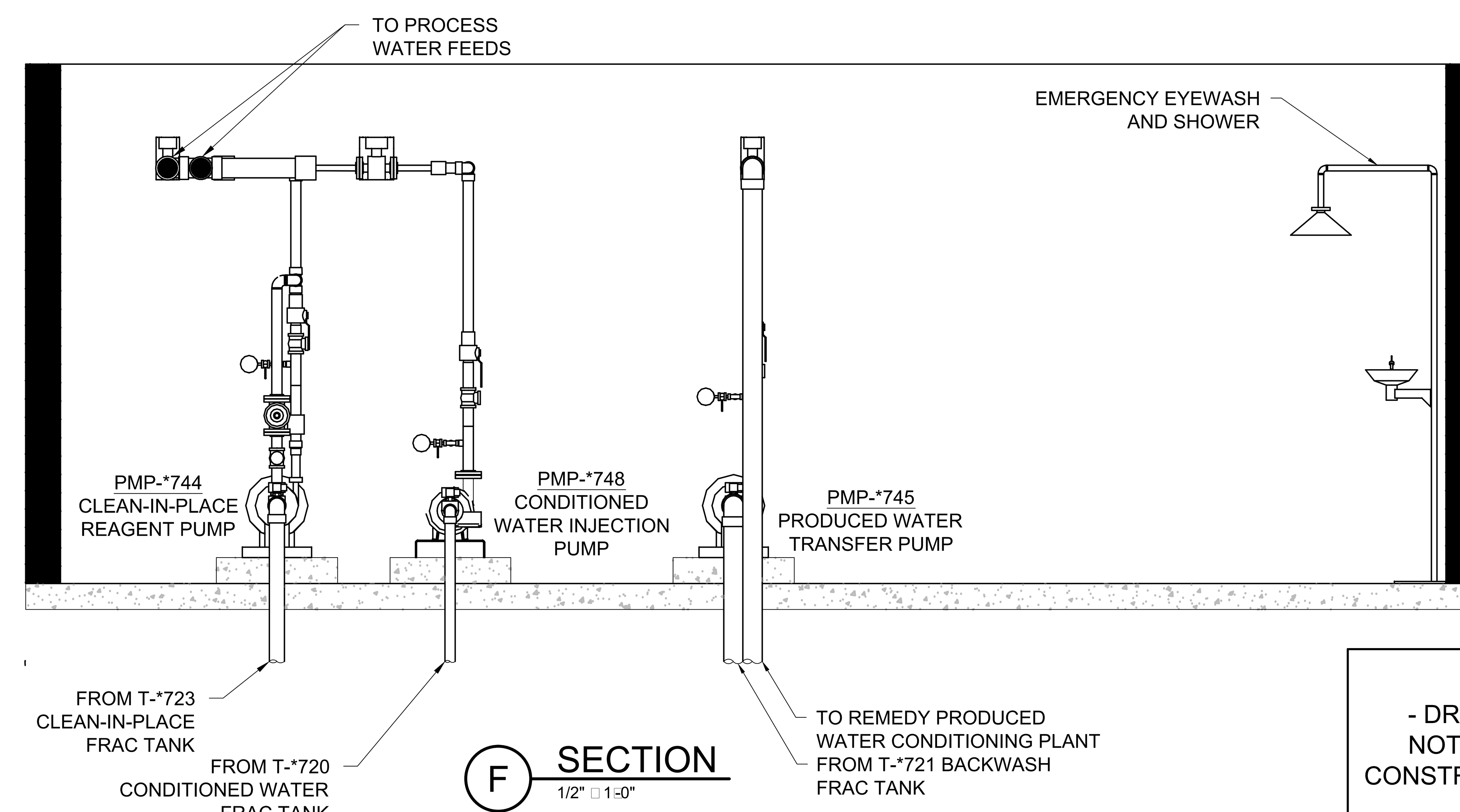
MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
M-06-02
REV 0



D SECTION
1/2" = 1'-0"
M-06-01



E SECTION
1/2" = 1'-0"
M-06-01



F SECTION
1/2" = 1'-0"
M-06-01

- DRAFT -
NOT FOR
CONSTRUCTION

ETIC ENGINEERING

ARCADIS

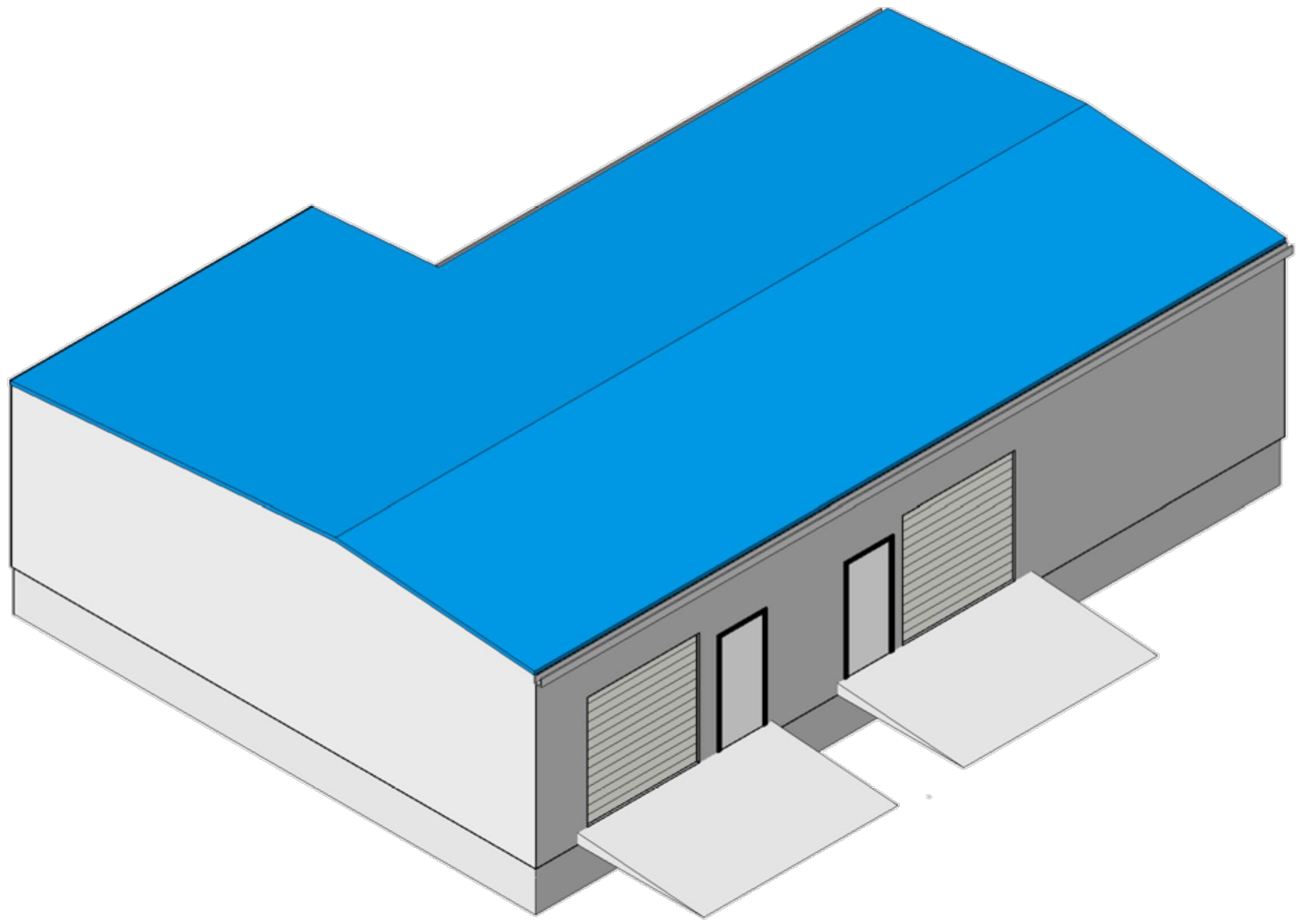
NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		LUK	JPB	KLD	BJW

REVISIONS

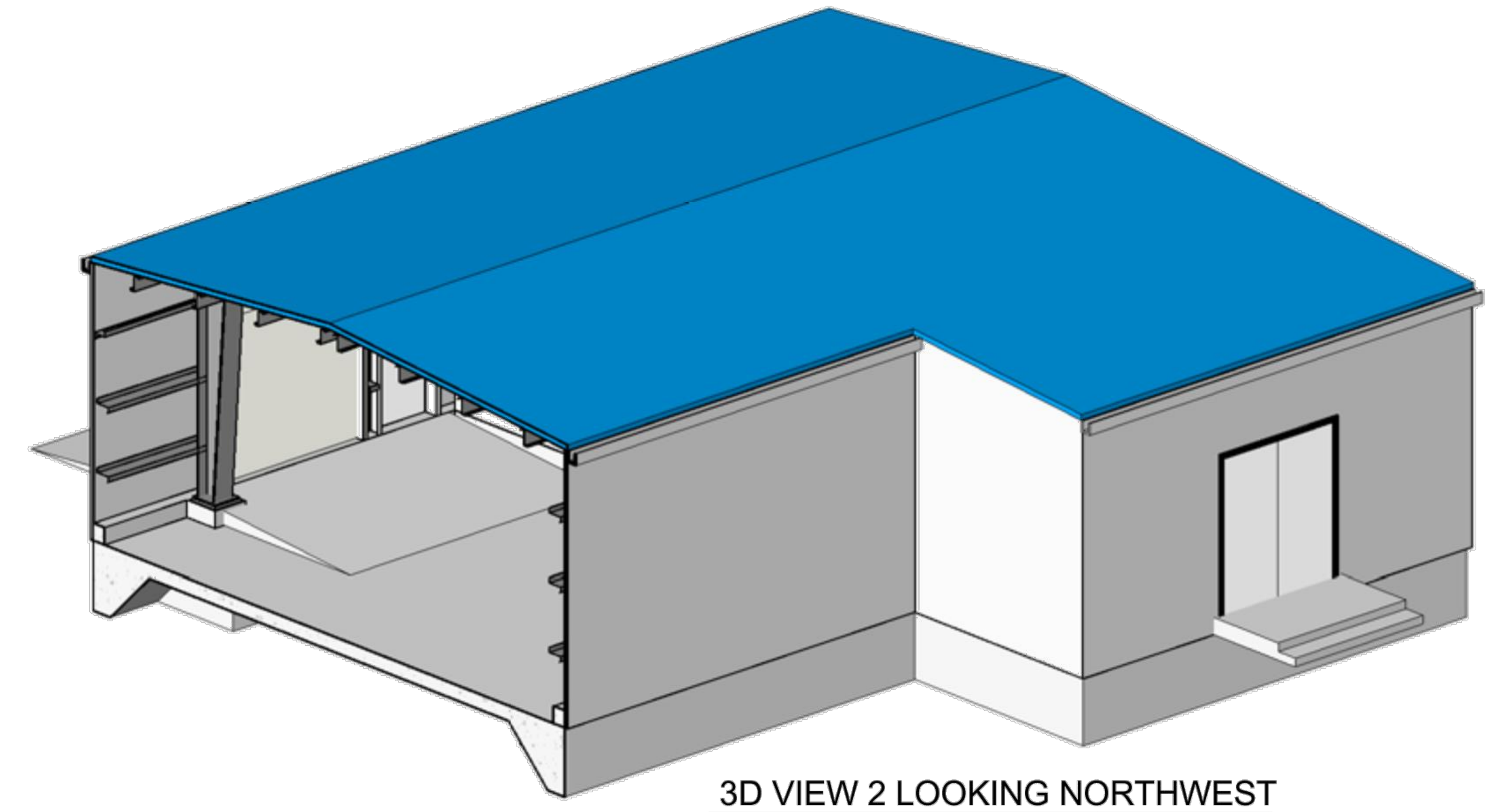
APPROVED BY: SO / SUPV / DSGN / DWN / CHKD / OK / DATE 8/5/15 / SCALES

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH CARBON
AMENDMENT BUILDING
MECHANICAL LAYOUT SECTIONS
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

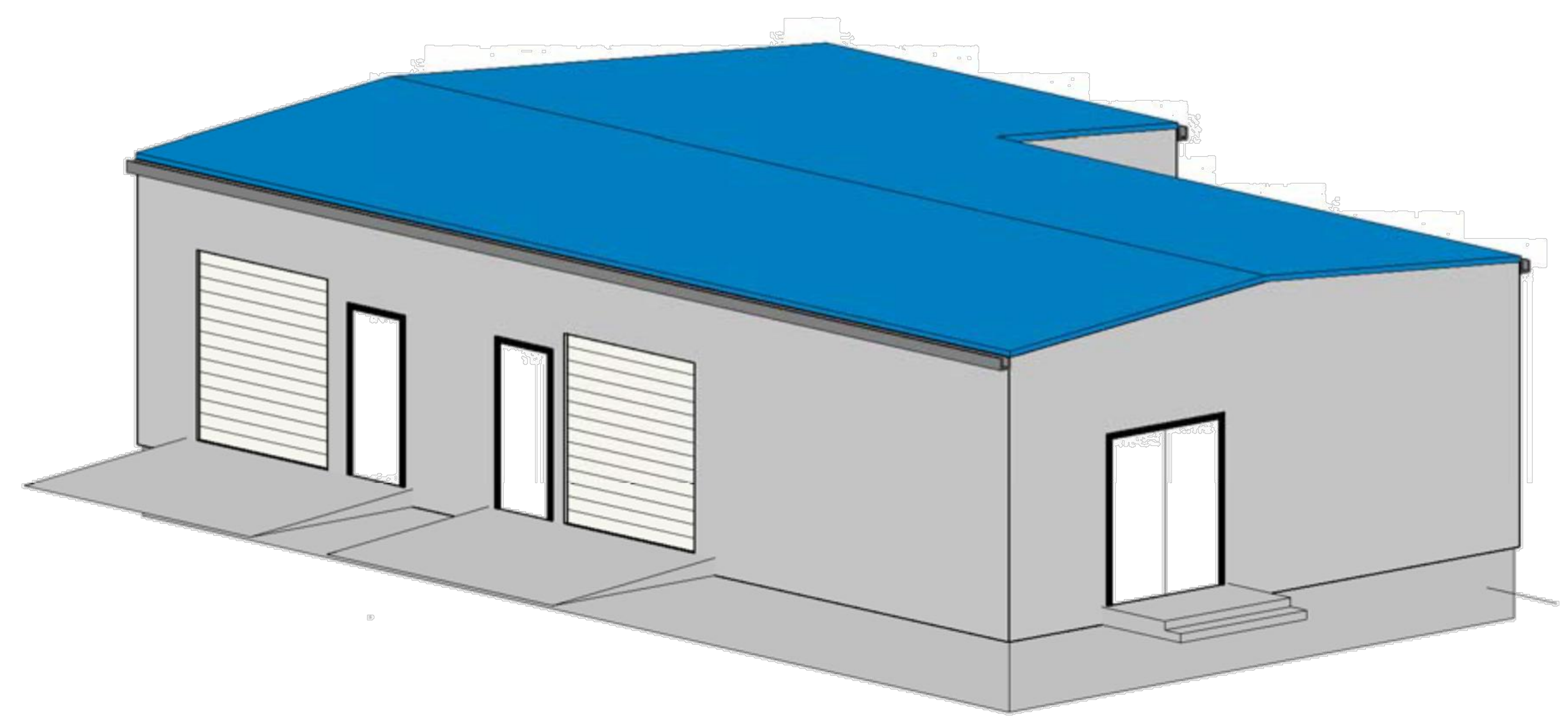
MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO. of SHEETS
M-06-03 REV 0



3D VIEW LOOKING SOUTHEAST



3D VIEW 2 LOOKING NORTHWEST



3D VIEW LOOKING NORTHEAST

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ETIC ENGINEERING

ARCADIS

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0	8/5/15	90% RTC RESOLUTION		CMW	KLD	MSL	MSL

REVISIONS

APPROVED BY	
SO	
SUPV	
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OK	
DATE	8/5/15
SCALES	

TOPOCK GROUNDWATER REMEDIATION PROJECT

MW-20 BENCH CARBON AMENDMENT BUILDING AXONOMETRIC VIEWS

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
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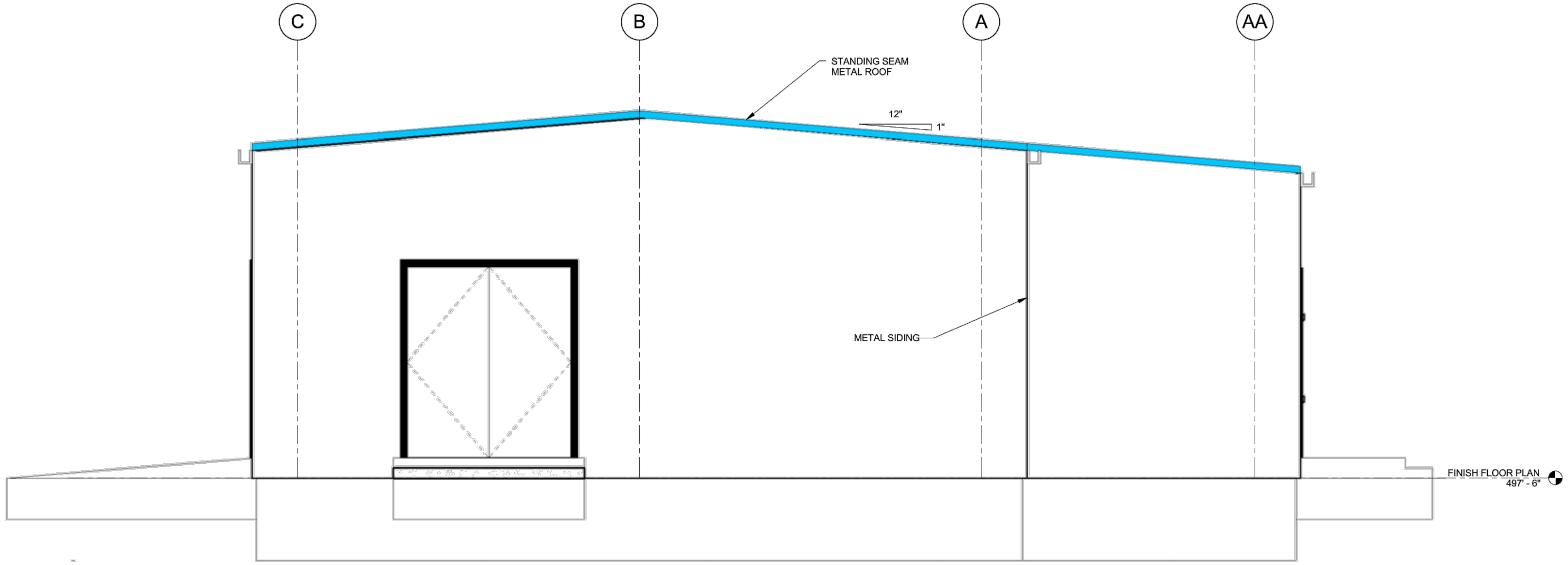

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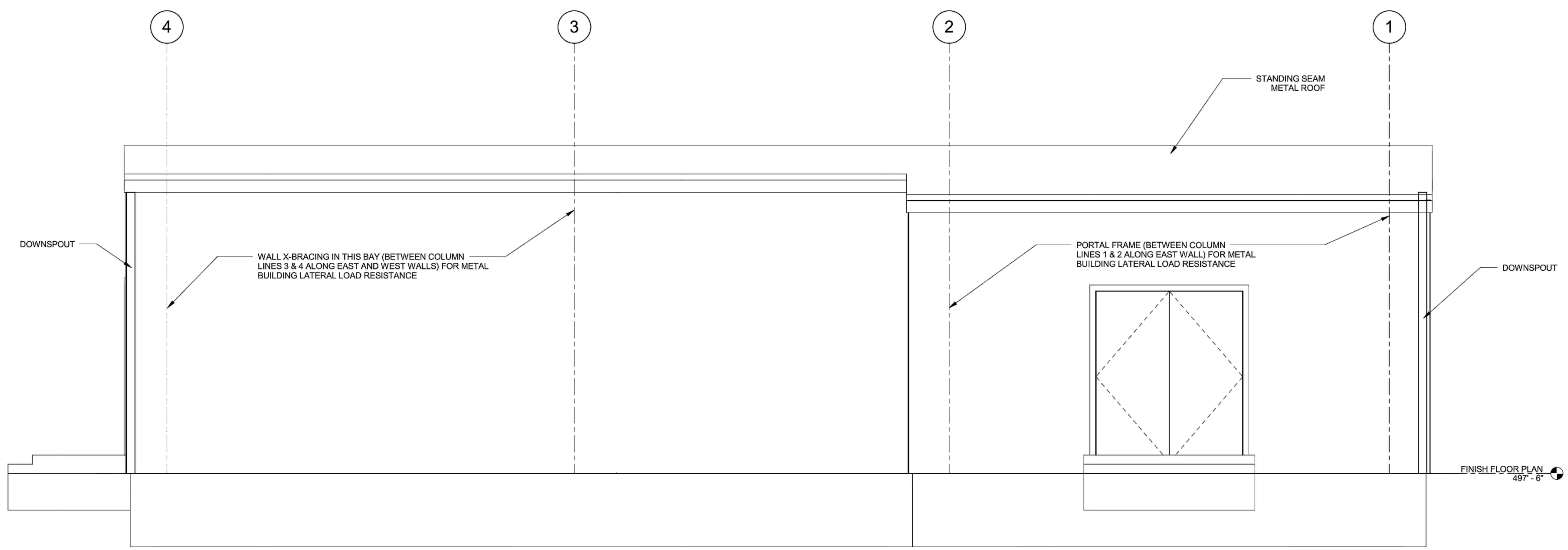

EAST ELEVATION
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ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		CMW	KLD	MSL	MSL

REVISIONS

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CHKD	
OK	
DATE	8/5/15
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TOPOCK GROUNDWATER REMEDIATION PROJECT

MW-20 BENCH CARBON AMENDMENT BUILDING ELEVATIONS (1 OF 2)

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
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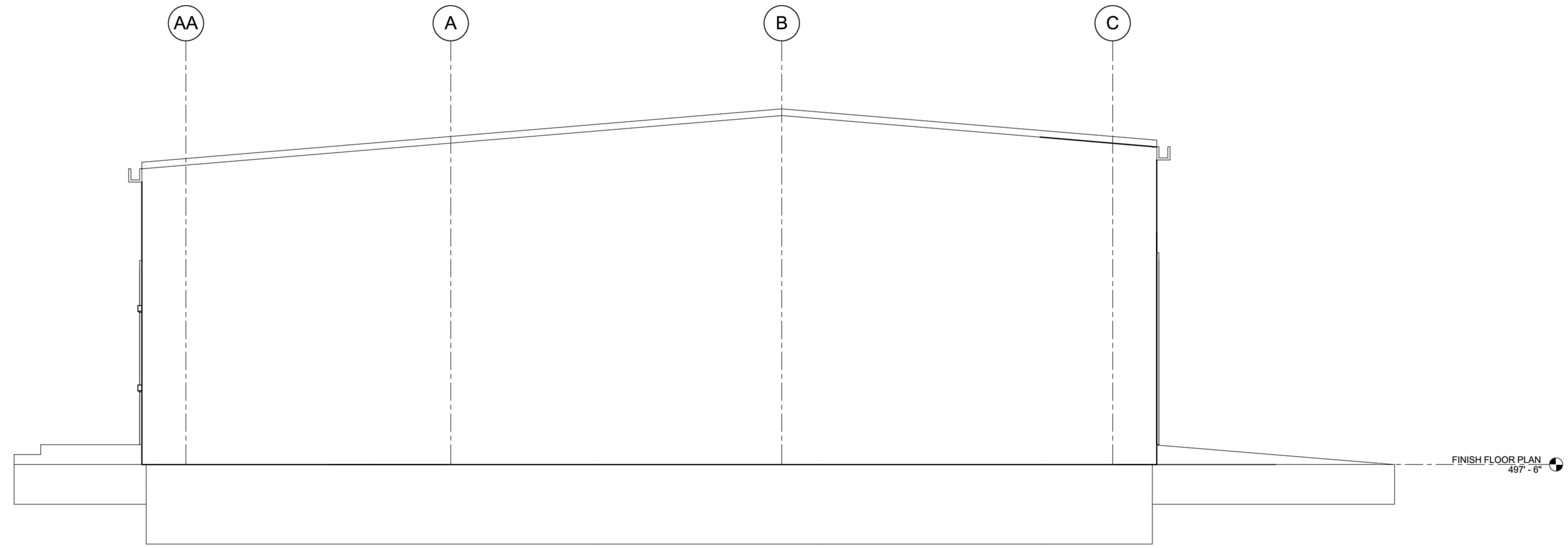

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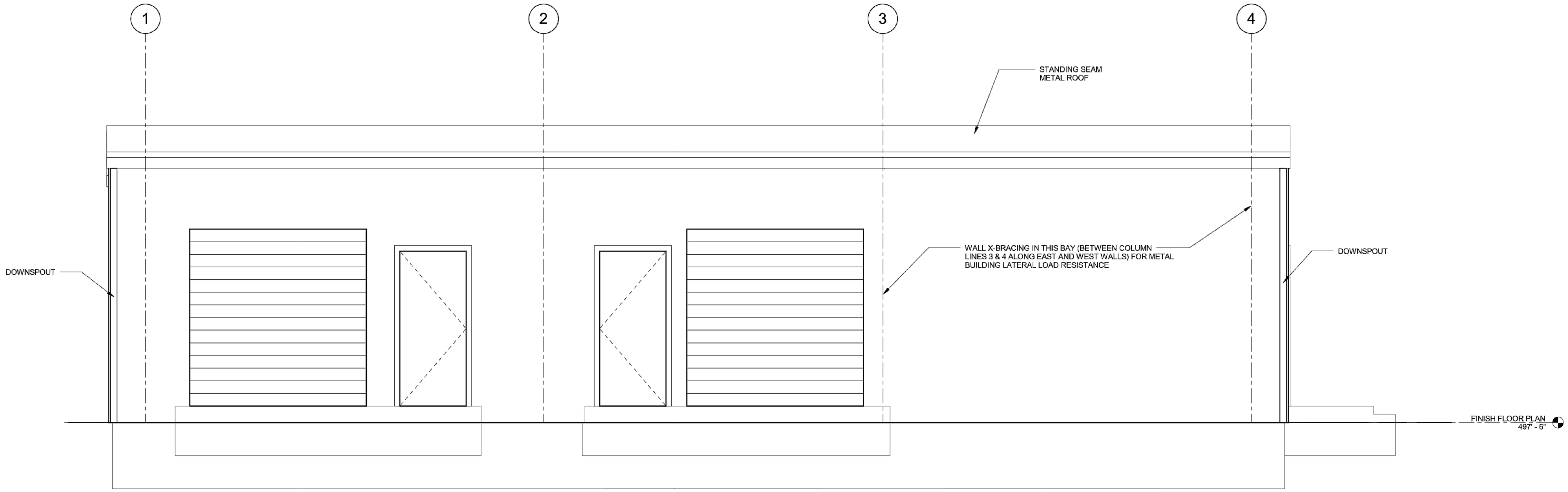

WEST ELEVATION
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CONSTRUCTION

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
0	8/5/15	90% RTC RESOLUTION		CMW	KLD	MSL	MSL

REVISIONS

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CHKD	
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DATE	8/5/15
SCALES	

TOPOCK GROUNDWATER REMEDIATION PROJECT
MW-20 BENCH CARBON
AMENDMENT BUILDING
ELEVATIONS (2 OF 2)
GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM	
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Attachment CC: RTCs #4, #17, #22, #32, #41, #43, and #126

MW-X and MW-Y

Evaluation of Technical Justification

for Proposed Monitoring Wells MW-X and MW-Y

July 15, 2015

by

Robert H. Prucha, PhD, PE (Integrated Hydro Systems, LLC, Golden, CO)

Margaret R. Eggers, PhD, RG, CHG (Eggers Environmental, Oceanside, CA)

Introduction

At the request of the Fort Mojave Indian Tribe (FMIT), this paper addresses the following:

1) Evaluation of the technical basis used for locating proposed monitoring wells, MW-X and MW-Y (see **Figure 1a**) along the Arizona shore of the Colorado River, across from the northern part of the proposed PG&E remediation system,
2) Description of further testing and evaluations that could be done to better determine the need and locations of the proposed monitoring wells, and
3) Description of an alternative basis for performance assessment of the proposed remedy near the river.

The FMIT objects to the planned monitor wells MW-X and MW-Y at the proposed locations along the Arizona bank of the Colorado River. The objection stems from the fact that the wells are proposed for siting in a "named place," eligible for nomination to the National Register of Historic Places. Additionally, the area is part of a broader traditional cultural landscape and is therefore culturally sensitive. The Tribe believes that the construction and operation of monitor wells within this area will result in a significant and irreversible adverse impact on the area. Accordingly, it is imperative that a decision, such as one that adversely impacts a culturally-sensitive area, be rigorously justified from a technical vantage. This paper addresses the validity of the technical justification which is being relied upon for placing monitor wells MW-X and MW-Y at the locations proposed by the Pacific Gas and Electric Company's (PG&E) consultants.

The focus of this review was to evaluate the technical rationale applied to the siting of proposed monitor wells MW-X and MW-Y including the use of the existing groundwater model and other data. In particular, **the potential for hydraulic communication beneath the Colorado River between the CA and AZ was evaluated**. This necessitated a thorough examination of the assumptions applied in deciding on the need for these wells within the performance monitoring network. The Department of Toxic Substances Control (DTSC) has relied heavily on the groundwater model as the basis for the design and operation of the proposed remedial system (CH2M Hill, 2014a). As such, DTSC has also relied exclusively on the model in its current state to conclude that monitoring wells are needed across the river, at the proposed MW–X and MW–Y locations in Arizona. This paper presents results and recommendations based on the following key findings related to review of the technical basis for proposed wells MW-X and MW-Y.

Figure 1a. Existing and Future Wells, and Proposed Remedy Monitoring Wells (MW-X and MW-Y) along River Bank in Arizona.

Key Findings

The following headings list the various factors examined as part of this evaluation and list findings related to each. Further details are presented in subsequent discussions.

Purpose: The stated purpose of proposed wells MW-X and MW-Y is unclear and seemingly for cross purposes. Some references suggest that their purpose is to act as "sentinel wells." Elsewhere it is suggested that they would be used in conjunction with existing monitor well MW-54 to solve a three-point solution for determining the direction of hydraulic gradient.

Data Evaluations: Evaluation of relevant data sets presented various project documents was performed. The following observations were made.

- The May 2008 IM-3 extraction well shutdown showed no response in Arizona wells.
- The September 2008 IM-3 extraction well shutdown test failed to demonstrate hydraulic connection in groundwater between California and Arizona.
- Based on available data, future pathways beneath the river and into Arizona groundwater are likely south of the proposed MW-X and MW-Y locations.
- The use and interpretation of Arizona groundwater information is limited.
-

Modeling: Available modeling reports were reviewed and the following observations were made.

- Groundwater flow paths beneath the River and into Arizona inferred from the model appear to be the sole technical basis for establishing need and locations of monitor wells MW-X and MW-Y. However, the model is unrealistic and unreliable for estimating current or future flow conditions in the vicinity of the River, both beneath the River and within Arizona. When originally constructed, model development and calibration focused on the plume area in California, and on remedial design/operation. Through the design phases (i.e., 30%, 60% and 90%), projections have been expanded into Arizona, where model performance has not been validated.
- The current Conceptual Site Model (CSM) does not adequately describe the spatial- or time-varying 3-dimensional flow paths in the vicinity of the river.
- The modeling of flow in the vicinity of the river, beneath it and within Arizona is unrealistic and highly uncertain. This makes any model predictions coming from this model unreliable for evaluating potential flow paths beneath the River under the proposed remedial system operation, in the vicinity of MW-X and MW-Y. Model limitations include:
    - Unrealistic and unfounded hydraulic property distributions within the model.
    - Model boundary conditions are physically unrealistic, or inconsistent with other studies in the area.

- Numerical representation of hydrogeologic contacts is inappropriate, and riverbed bathymetry improperly specified.
- Calibration of the model is poorly presented, missing in Arizona, and questionable.
- The groundwater model code doesn't simulate density-dependent conditions, which would predict different results than assuming a constant groundwater density.
- The MODFLOW code does not simulate density-dependent flow, which likely influences potential groundwater flow between the aquifer and the River and beneath the River into Arizona.
- Results for model updates following the 60% BOD were not reported in the 90% BOD, nor provided to tribes for further review.
- Simulated results of freshwater extraction in Arizona (at either HNWR-1A or Site B) appear unrealistic, overly simplified and do not fully assess impacts on groundwater levels, groundwater hydraulic gradients or the effects of River fluctuations in the vicinity of proposed MW-X and MW-Y.

Recommendations for Further Testing/Evaluations: The following program of testing and evaluation merits consideration for the purpose of resolving the uncertainties associated with the need for monitor wells MW-X and MW-Y, and their siting.

- Field Testing:
  - Conduct tracer testing in existing Arizona monitoring wells.
  - Collect additional continuous monitoring data from existing Arizona wells.
  - Develop more appropriate groundwater contour maps in time, using density-corrected data.
- Model Update:
  - Revise CSM with new data (i.e., tracer testing and continuous monitoring).
  - Correct and re-calibrate the model to IM-3 data.
  - Re-simulate future scenarios, evaluating the need and proposed locations of MW-X and MW-Y.

Alternative Basis for Assessment of Remedy Performance: As a possible alternative for monitoring remedy performance, in lieu of using monitor wells MW-X and MW-Y, define a hydraulic target boundary along eastern plume boundary, and 'down-gradient' sentinel wells between the plume boundary and western river bank.

Purpose of Proposed Monitor Wells MW-X and MW-Y is Unclear

Before any new monitoring wells in Arizona are constructed, a clear and unambiguous purpose must be established. Currently, the purpose for MW-X and MW-Y appears unclear and raises additional questions.

In reference to the need for the proposed wells, DTSC has noted that:

> "… *the importance of these wells as sentry wells for the remedy which will purposely accelerate groundwater flow towards Arizona. Fundamentals on capture zone analysis and associated sentry wells can be found in* A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems *(USEPA, 2008). DTSC could not approve the remedy without sentry wells. The remedy would have to be drastically modified (groundwater flow in the area would have to move in an opposite direction – towards the west) if sentry wells were to be eliminated."*
>
> "*These wells need to be installed early to establish baseline concentrations for water quality constituents (e.g., baseline chromium concentrations) so any naturally occurring trends can be observed before remedy start up. This will assist in determining if the well has been adversely affected by the remedy.* "[1]

Similarly, the Arizona Department of Environmental Quality (ADEQ) has expressed support for monitor wells at the proposed MW-X and MW-Y locations.[2]

If the proposed wells are to verify hydraulic gradient control of remediation system, this will be challenging for the following reasons:

- As noted in Vol. 2 of the O&M 90% BOD document, it would require 4 different lines of evidence, including use of the groundwater flow model, which is unreliable for this purpose in the vicinity of the river and Arizona where MW-X and MW-Y have been planned. Further adding to the challenge, all time-varying hydraulic stresses (such as other pumping wells and river fluctuations) acting on groundwater in this area need to be considered in the evaluation.

- This could be done more effectively by monitoring groundwater in wells in California, or by simply adopting a more appropriate target capture zone boundary west of the river (as described in the next section).

- Even if hexavalent chromium (Cr(VI)) or byproducts were detected in proposed monitor wells MW-X and MW-Y, or even MW-54, what decisions are then to be made? Would this actually pose any problem that could not be easily remedied by increasing riverbank extraction rates as

[1] See DTSC comment No. 6 on the 90% Design BOD.
[2] Letter from Ms. Taber, ADEQ to Mr. Yue, DTSC, and Ms. Innis, DOI, re "Groundwater Remedy Design Documents – Additional Comments," March 26, 2015.

indicated for Scenario 1 on Figure A1-18 in USEPA 2008? RAO #4 does not prohibit temporary plume expansion, it just cannot be permanent.

On the other hand, if the proposed wells are to also monitor concentration trends:

- It should be noted that multiple sampling events of AZ wells (see Figure 1, page 3 in ADHS, 2005) have already shown broad spatial occurrence of Cr(VI) in AZ wells detected up to ~26 micrograms per liter (µg/l). Therefore, a likely low detection of Cr(VI) in MW-X and MW-Y wells on the AZ side would be at best ambiguous as to its source.

- The USEPA 2008 paper describes details associated with capture zones, but does not consider the added complexity of in situ treatment upgradient of riverbank extraction wells at Topock. As such, the riverbank wells and associated monitoring wells in their vicinity should be considered sentinel wells that monitor both hydraulic capture and concentration trends.

- Arcadis (90% BOD O&M Vol. 2 report, Figure 2.2-1) suggests that these wells are to monitor riverbank extraction (see **Figure 1b**), but it is unclear how this would be done, or how the effects of solely riverbank extraction would be isolated from all other hydraulic stresses that already affect the MW-X and MW-Y area.

- Arcadis (90% BOD O&M Vol. 2 report, page 4-10) states that:

  "*In model layers 3 and 4 (the deep portion of the aquifer where the river bank wells are screened and where the majority of the floodplain Cr(VI) plume exists), 6 well pairs in each model layer were selected to define the expected average hydraulic gradient differences for four scenarios: (1) ambient (non-pumping), (2) nominal river bank extraction (150 gpm), (3) decreased river bank extraction (75 gpm), and (4) increased river bank extraction (300 gpm). In all scenarios, the simulated flow conditions had the NTH IRZ turned off as this is the remedy operating condition for 75% of the time (6 months ON/ 18 months OFF). The 'decreased river bank extraction' scenario (75 gpm) represents an approximation of the threshold where complete hydraulic plume control is achieved above this pumping rate and hydraulic plume control is potentially compromised below this rate. Thus, the well pair average hydraulic gradients simulated for this pumping scenario represent thresholds for hydraulic plume control.*"

  "Neither MW-X nor MW-Y are included in the 6 well pairs in Layers 3 and 4 to demonstrate "complete hydraulic plume control."[3]

Ultimately, if the two Arizona monitoring wells are proposed to confirm that gradients are maintained as predicted by the model, the existing model is deficient in a number of areas. These deficiencies then produce highly uncertain and unreliable results near and beneath the River and in Arizona. Principally, the modeled depiction of the hydraulic conditions beneath the Colorado River was not previously a

[3] Note: gpm = gallons per minute.

focus for this project. Therefore, this area of the model should be carefully reviewed and modified to more closely resemble the anticipated actual River conditions.

Groundwater flow from California toward Arizona beneath the Colorado River is possible due to a) decreased water levels in Arizona side extraction of HNWR-1 and/or Site B wells ranging from 450 to 900 gpm, and b) increased water levels in California due to the net addition of between 450 to 900 GPM in the proposed remediation area (see **Figure 2**). This results in a net increase of flow from California to Arizona of between 900 and 1,800 gpm.

It should be noted that the existing conditions at the site, under the IM-3 pumping influence, have been fundamentally relied upon to develop the groundwater flow and fate/transport models, which are then used to predict future groundwater flow paths, hydraulic gradients and concentration trends. However, an adequate demonstration of model calibration performance against years of carefully monitored groundwater flow and fate/transport data in the principle target remediation area in either California (i.e., IM-3 monitoring data) or Arizona has not been performed. Especially considering that the future pumping conditions will be quite different, the model has many apparent deficiencies which should be addressed prior to attempting to determine whether additional monitoring wells MW-X and MW-Y are needed, and where their locations and construction should be.

Figure 3 shows some simulated groundwater pathlines appear to migrate beneath the Colorado River and into the area of proposed monitor wells MW-X and MW-Y, assuming the National Trails Highway (NTH) In-Situ Reduction Zone (IRZ) system is active. It is our understanding that these model results are the primary technical basis for DTSC's position requiring monitor wells MW-X and MW-Y. However, the model should not be used to make these determinations before addressing the numerous deficiencies in the area beneath the River and along the river banks noted later in this evaluation.

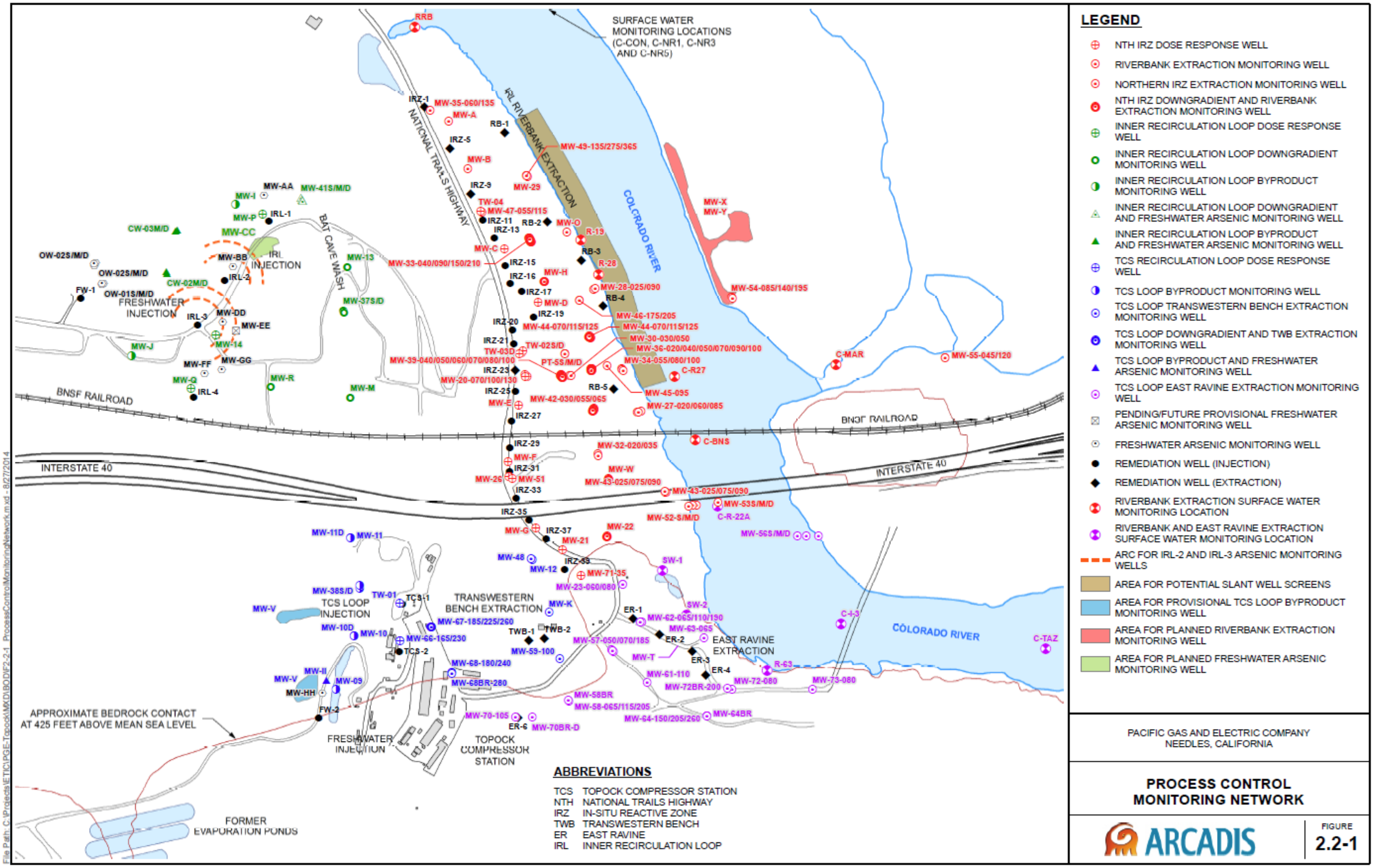

Figure 1b. Monitor wells MW-X and MW-Y are for "Area for Planned Riverbank Extraction Monitoring Well," but it is unclear whether it is for gradient control, detecting concentrations, or both. From 90%BOD OM Volume 2 Report (CH2M Hill, 2014a).

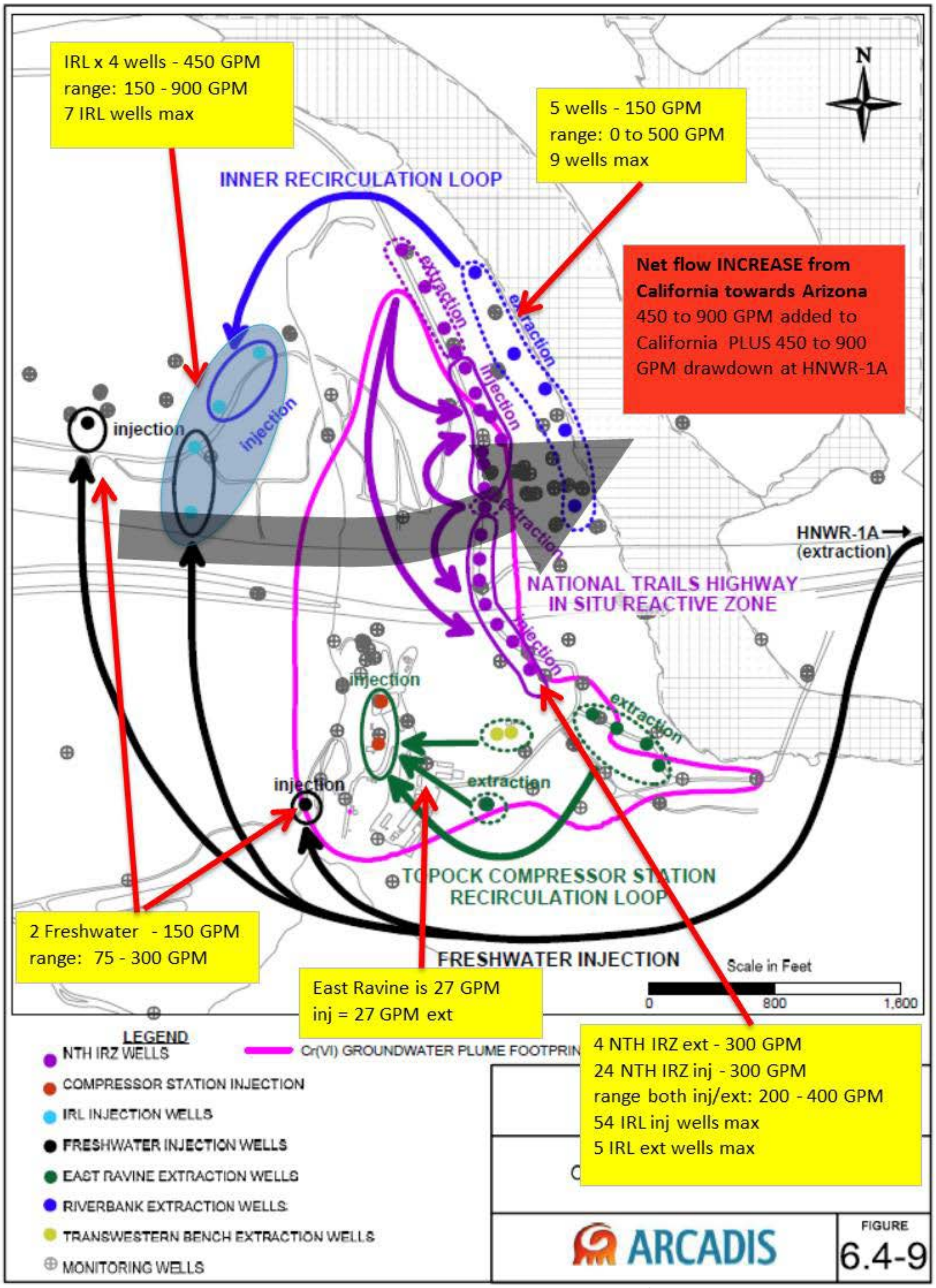

Figure 2. Major proposed remedial components and water routing.[4]

[4] As proposed in the 90% BOD, 450 to 900 gpm will be added in CA concurrent with the extraction of the same amount in AZ, thereby resulting in increased flow from CA towards AZ. By comparison, the current IM-3 extraction of ~130 gpm causes local flow from the direction of the River (possibly from Arizona), but is partially offset by upgradient injection.

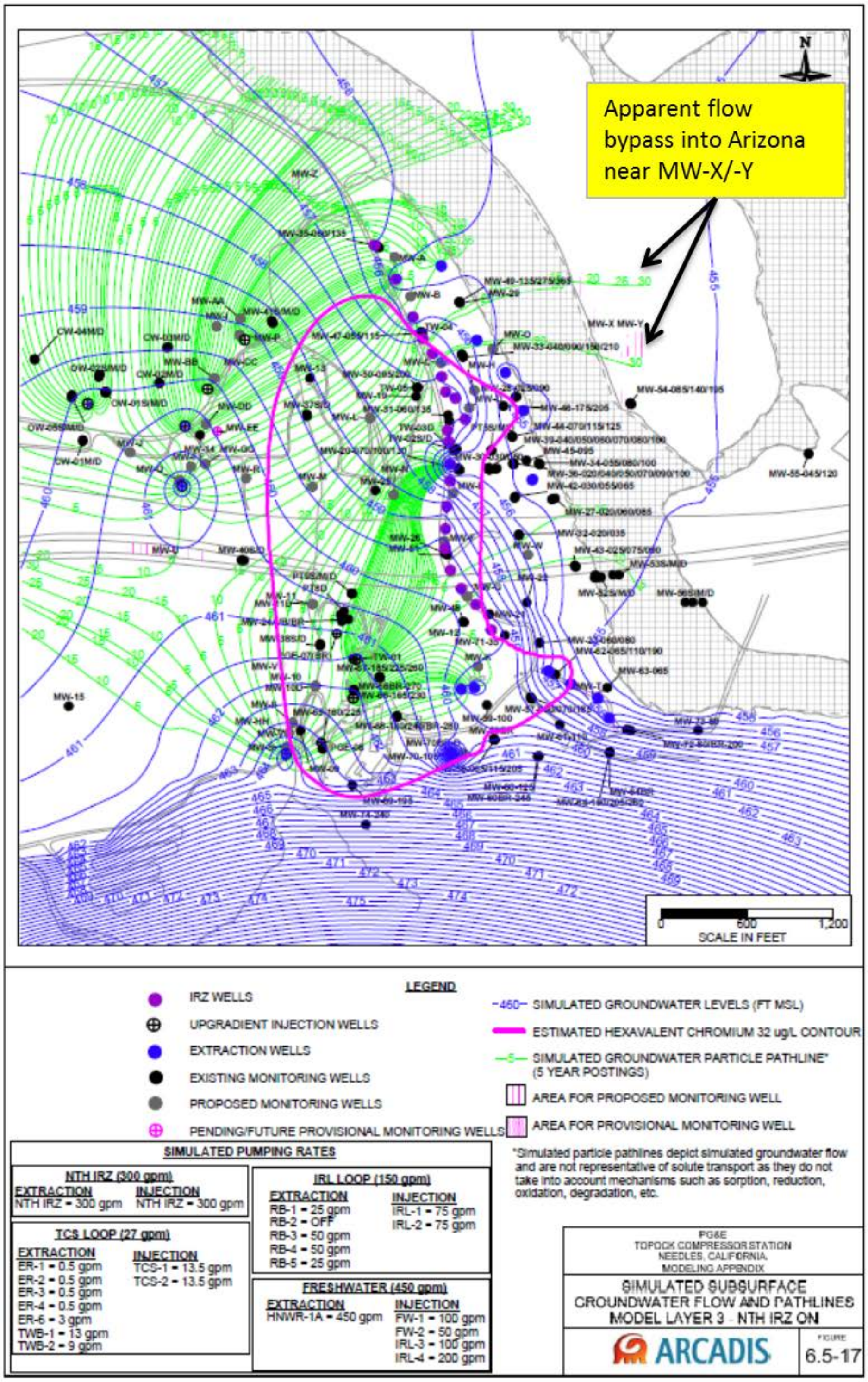

Figure 3. Simulated groundwater particle pathlines for model layer 3 with the NTH IRZ active (CH2M Hill, 2014d).[5]

[5] Some groundwater paths (shown in green) show apparent flow beneath the River and into AZ near proposed monitor wells MW-X and MW-Y. These paths are unreliable, however, due to flaws in the model.

Alternative 'Downgradient' Monitoring Location

A Target Capture Zone (or "Boundary of Hydraulic Containment Area" as shown on **Figure 4** and described at length on pages 6 and 8 of "*A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems*" (USEPA, 2008)), could be defined for the Topock site as the eastern boundary of the current Cr(VI) plume, based on meeting the Remedial Action Objectives (RAOs). The 90% BOD report states the following (CH2M Hill, 2014a, page vi):

> *"The Remedial Action Objectives (RAOs) for the selected groundwater remedy at the Topock site are to:*
>
> 1. *Prevent ingestion of groundwater as a potable water source having Cr(VI) in excess of the regional background concentration of 32 micrograms per liter (µg/L[6]).*
> 2. ***Prevent or minimize migration of total chromium (Cr[T]) and Cr(VI) in groundwater to ensure concentrations in surface water do not exceed water quality standards that support the designated beneficial uses of the Colorado River (11 µg/L Cr[VI]).***
> 3. *Reduce the mass of Cr(T) and Cr(VI) in groundwater at the site to achieve compliance with the applicable or relevant and appropriate requirements (ARARs) in groundwater. This RAO will be achieved through the cleanup goal of the regional background concentration of 32 µg/L of Cr(VI).*
> 4. ***Ensure that the geographic location of the target remediation area does not permanently expand following completion of the remedial action."*** [Emphasis added.]

On page 4-8, Section 4.3.1 in the *Sampling and Monitoring Plan* (CH2M Hill, 2014c), the following is stated:

> "*The objective of RAO 2 is to limit Cr(VI) dissolved in groundwater at the site from migrating into the Colorado River. The remedy addresses this requirement through in-situ and groundwater pumping. The groundwater extraction wells are to be installed as part of the NTH IRZ (River Bank Extraction Wells) and the TCS Loop (East Ravine Extraction Wells). The hydraulic control evaluation is to assess the performance of the groundwater extraction well element of the remedy*."

As written, RAO #2 implies that there would be no violation as long as Cr(VI) and Cr(T)[7] concentrations do not cause Colorado River water concentrations to exceed 11 µg/. It can be shown that this would never happen due to the effects of dilution of normal River flow relative to the very small potential groundwater inflow. But, defining the target hydraulic barrier as the eastern plume boundary would provide greater assurance that RAO #2 would never be impacted. This however, would likely require re-evaluation and adjustment to the currently proposed 90% BOD design and operation of the NTH IRZ and Riverbank Extraction wells, such that existing contaminated groundwater does not move east into clean

[6] Note: µg/l = micrograms per liter
[7] Note: Cr(T) = total chromium

areas, between the eastern plume boundary and the river bank. At a minimum, RAO #2 supports making the western River shoreline the vertical target hydraulic barrier.

RAO #4 implies that it is acceptable for the plume to temporarily expand into clean areas, but that such expansion cannot extend beyond the projected remedial timeframe. This provision renders any assessment of the RAO compliance virtually impossible until the end of the remediation. Though the "target remediation area" does not necessarily correlate to the actual plume area, this RAO is interpreted to mean that the Cr(VI)-contaminated area should not expand into currently clean areas. This seems consistent with text on pages 2-3 in the 90% BOD Operation and Maintenance Manual Volume 2 (CH2M Hill, 2014c), that states:

> "*The data collected will be analyzed to ensure that the concentrations of Cr(VI) and remedy by-products, specifically manganese and arsenic, do not permanently increase outside of the baseline Cr(VI) plume*".

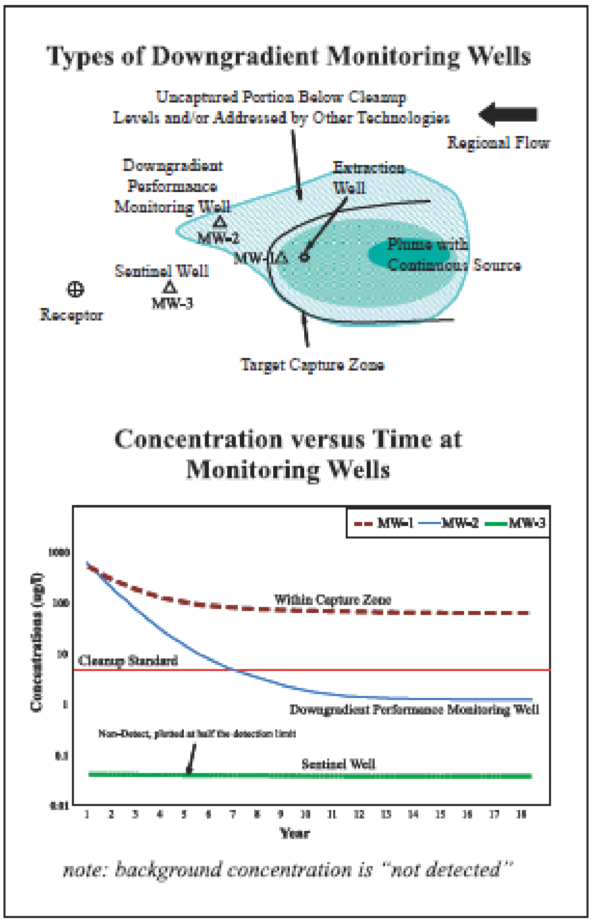

Figure 15. Types of downgradient monitoring wells.

Allowing a system design and operation to cause even the potential movement of the plume into Arizona, with no plan on remediating Arizona groundwater, seems inappropriate.

Because current Cr(VI) contamination is limited to the red outline (**Figure 5**), if a Target Capture Zone boundary is defined along the eastern edge of the plume area, any monitoring wells between the plume edge and the River could then be considered Sentinel Wells (as per Figure 15 in USEPA, 2008, shown to the left), while monitoring wells within the plume area would be considered Performance Monitoring Wells. This would ensure that currently clean areas east of the "baseline" plume extent would not become impacted (RAO #4) and the Receptor (i.e., the River) shown on Figure 15 would not get impacted (i.e., RAO #2), thereby eliminating the need for proposed monitor wells MW-X and MW-Y on the eastern shoreline of the River in Arizona.

Though the USAEPA (2008) Figure 15 (**left**) is a simplified version of the Topock Site, the NTH IRZ extraction wells, represent the 'Extraction Wells' shown, while the Riverbank Extraction wells are a secondary line of extraction intended to intercept treated water and re-inject it back into IRL wells. Extraction wells can be easily added, or rates increased if California monitoring shows expected gradients or concentration thresholds are exceeded.

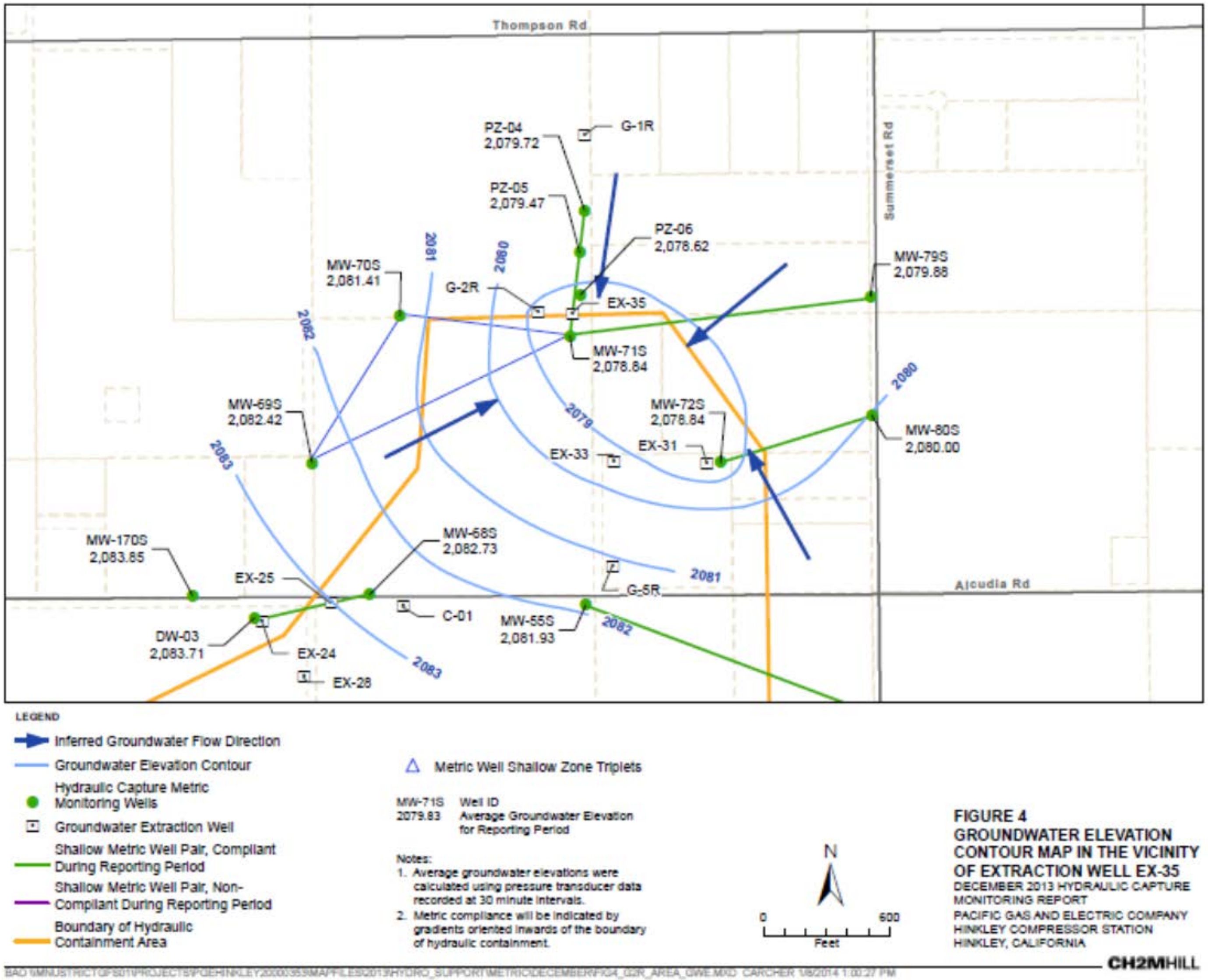

Figure 4. Boundary of Hydraulic Containment Area (orange line) at the Hinkley Site, across which gradients are closely monitored via well pairs/triplets (green lines between wells shown with green dots). (From PG&E, 2014).

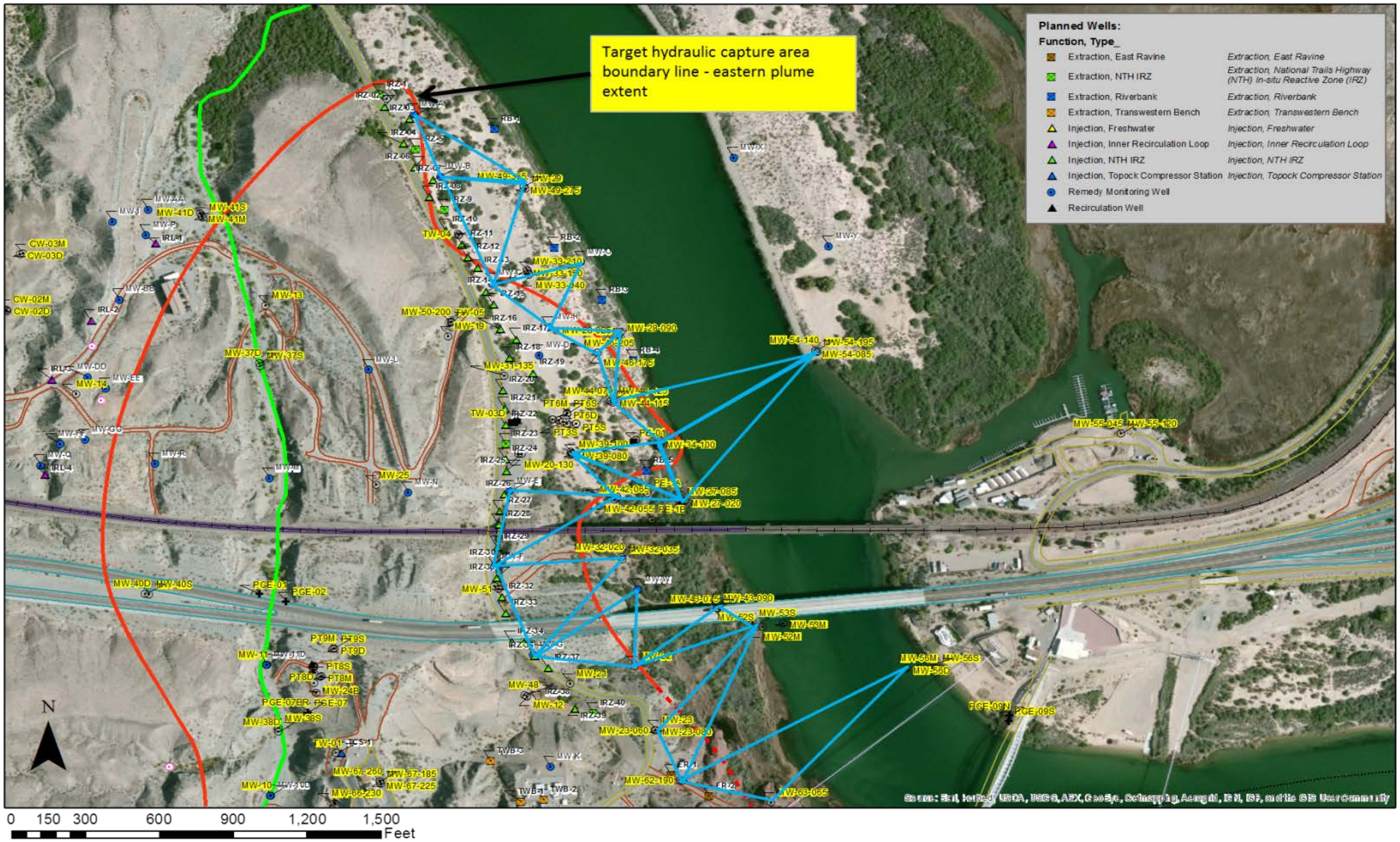

Figure 5. The red line bounds the 32 ug/L Cr(VI) plume (From CH2MHill 2014a).[8]

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[8] This should be the "Target Capture Zone Boundary", which prevents contamination to the east. Blue lines represent triangles between monitoring wells (i.e., "triplets") that could be used to confirm hydraulic whether gradients are maintained such that contaminants do not move further east than the red line. Precise topographic and water level elevations would be required. Sentinel wells could be placed between the plume's eastern boundary (red line) and River bank.

Possible Pathway into Arizona Groundwater is Likely South of Proposed MW-X and MW-Y

Detectable Cr(T) and Cr(VI) Concentrations in Arizona

Even if a pathway and hydraulic connection exists beneath the river, detectable concentrations of Cr(T) and Cr(VI) at well MW-55-120 suggest it would be situated considerably (~800 feet) south of the proposed locations of MW-X and MW-Y and ~400 feet south and ~1,200 feet east of MW-54 (and ~2,000 feet east of IM-3 extraction well PE-1). If the concentrations of Cr(VI) and Cr(T), detected only in recent quarterly monitoring rounds at MW-55-120 are from the west side of the river, the entire CSM would need to be revised to account for such a pathway (i.e., are there unknown Arizona production wells drawing groundwater eastward). Alternatively, such detections could be from background concentrations in Arizona, similar to those reported by ADHS (2005). In any case, this information suggests monitor wells MW-X and MW-Y are unnecessary because multi-level monitor well MW-54 to the north has consistently shown non-detects for Cr(VI) and Cr(T) in quarterly monitoring reports. **Table 1** (Table 3-1 in CH2MHill, 2015) summarizes current data and suggests that if any "downgradient" Arizona groundwater should be monitored it would be at a location to the south of MW-54, not north where MW-X and MW-Y are proposed.

TABLE 3-1
Groundwater Sampling Results, February 2014 through March 2015
First Quarter 2015 Interim Measures Performance Monitoring and Site-wide Groundwater and Surface Water Monitoring Report,
PG&E Topock Compressor Station, Needles, California

Location ID	Aquifer Zone	Sample Date	Sample Method	Hexavalent Chromium (µg/L)	Dissolved Chromium (µg/L)	Specific Conductance (µS/cm)
MW-52D	DA	17-Dec-14	Slant	ND (1.0)	ND (1.0)	22,000
MW-53M	DA	30-Apr-14	Slant	ND (1.0)	ND (1.0)	---
		17-Dec-14	Slant	ND (1.0)	ND (1.0)	20,000
MW-53D	DA	30-Apr-14	Slant	ND (1.0)	ND (1.0)	---
		17-Dec-14	Slant	ND (1.0)	ND (5.0)	27,000
MW-54-85	DA	09-Apr-14	3V	ND (1.0) J	ND (1.0)	9,230 J
		18-Nov-14	MP	ND (0.20)	ND (1.0)	10,600
		18-Nov-14 FD	MP	ND (0.20)	ND (1.0)	10,500
MW-54-140	DA	09-Apr-14	3V	ND (1.0) J	ND (1.0)	12,300 J
		09-Apr-14 FD	3V	ND (1.0) J	ND (1.0)	12,200 J
		18-Nov-14	MP	ND (0.20)	ND (1.0)	12,900
MW-54-195	DA	09-Apr-14	3V	ND (1.0) J	ND (1.0)	18,300 J
		18-Nov-14	MP	ND (2.0)	ND (1.0)	19,500
MW-55-45	MA	18-Nov-14	MP	ND (1.0)	ND (1.0)	1,470
MW-55-120	DA	18-Nov-14	MP	7.5	7.2	8,930
MW-56S	SA	10-Apr-14	Slant	ND (1.0) J	5.3	6,390 J
		18-Dec-14	Slant	ND (0.20)	ND (1.0)	7,080
MW-56M	DA	10-Apr-14	Slant	ND (1.0) J	1.8	14,400 J
		18-Dec-14	Slant	ND (1.0)	ND (5.0)	14,100
MW-56D	DA	10-Apr-14	Slant	ND (1.0) J	ND (1.0)	19,800 J
		18-Dec-14	Slant	ND (1.0)	ND (5.0)	2,040

Table 1. Cr(VI) and Cr(T) concentrations detected at MW-55-120, MW-56S and MW-56M (from Table 3-1 in CH2M Hill, 2015

Several additional points can be made about the plume migration:

- **Figure 6** suggests the plume migrated towards the east, virtually at (or beneath) the Colorado River, near well monitor well MW-34. This migration from the southernmost plume extent strongly indicates a preferential pathway from the western high concentration area (darker plume color) towards the southeast, or towards the area bounded by MW-54 to the north and MW-56 towards the south, and directly towards MW-55 to the east. This direction appears consistent with increased permeability assigned to model layers 2 and 3 and beneath the river, and former areas within the active Colorado River (see **Figure 7** showing 1942 image and former River bank). **Figure 8** shows the maximum annual head difference calculated from continuous measurements.
- The majority of the existing plume (either by area or by mass) in California (**Figure 6**) lies well south of proposed monitor well MW-X and MW-Y locations. Therefore, Cr(VI) concentrations are much more likely to be detected at proposed wells MW-54, MW-55 or MW-56 than MW-X and MW-Y, well to the north, given the southerly average annual flow of groundwater through Lake Mohave Basin flow, which is discharged to the Colorado River as it funnels through the narrow Topock Gorge.
- The highest concentrations (**Figure 6**) within the current plume also occur well south of the proposed monitor well MW-X and MW-Y locations and would most likely be detected at the MW-54, MW-55 and MW-56 wells. So, these wells appear more than adequate to both detect changes in concentration with time and to monitor hydraulic gradients in the area.
- The Colorado River in this area likely acts as a sink, or net discharge location for groundwater, and because groundwater flow is directed from north to south, any “breakthrough” into Arizona groundwater would likely be south of the proposed locations of monitor wells MW-X and MW-Y. This is consistent with-widely accepted regional groundwater flow concepts (e.g., Tóth, 1963, Freeze, 1967).

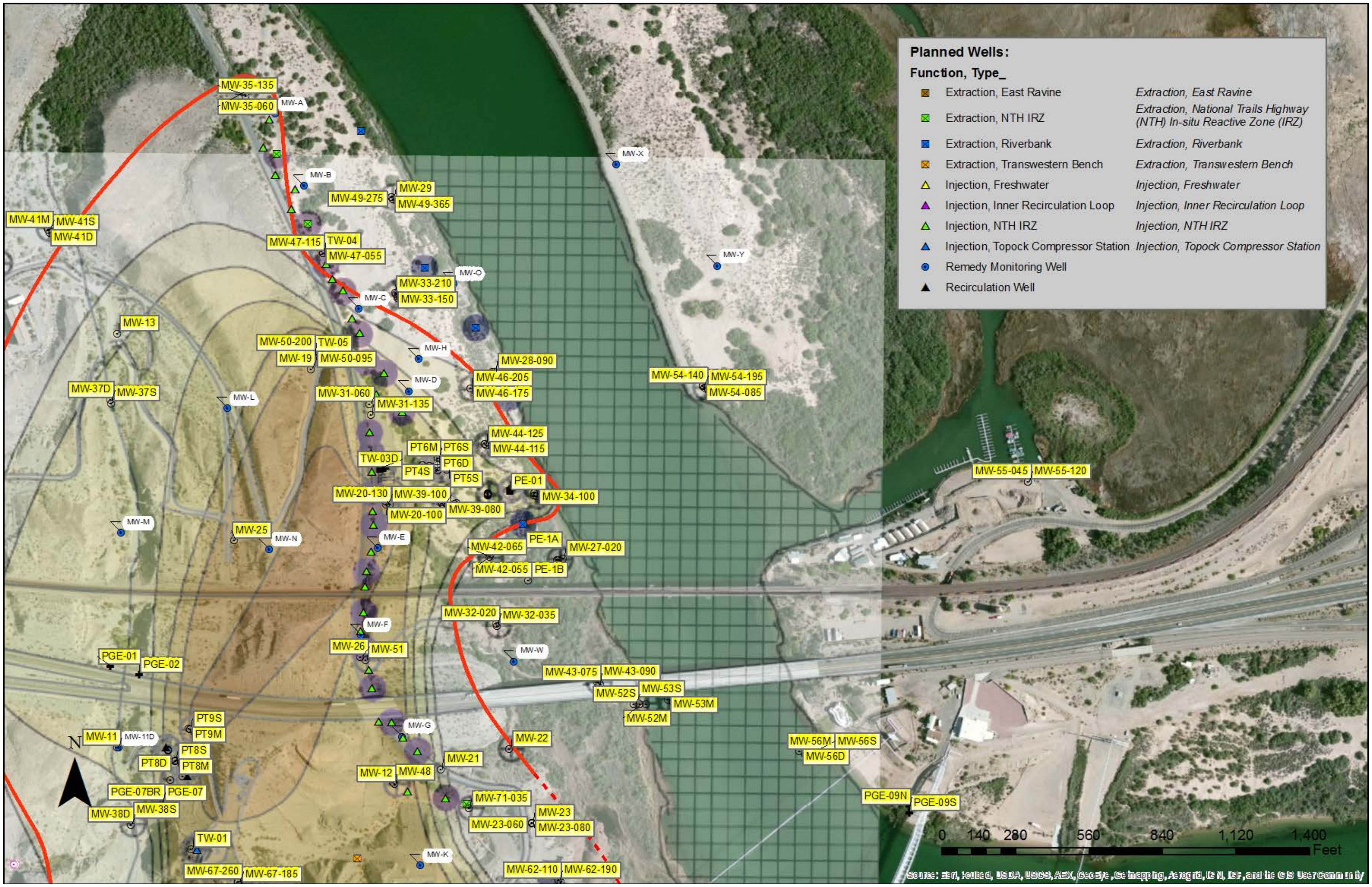


Figure 6. Model Layer 4 concentration contours (from Figure 6.2-4 in CH2M Hill, 2014d). The majority of the plume is well south of proposed MW-X and MW-Y wells.

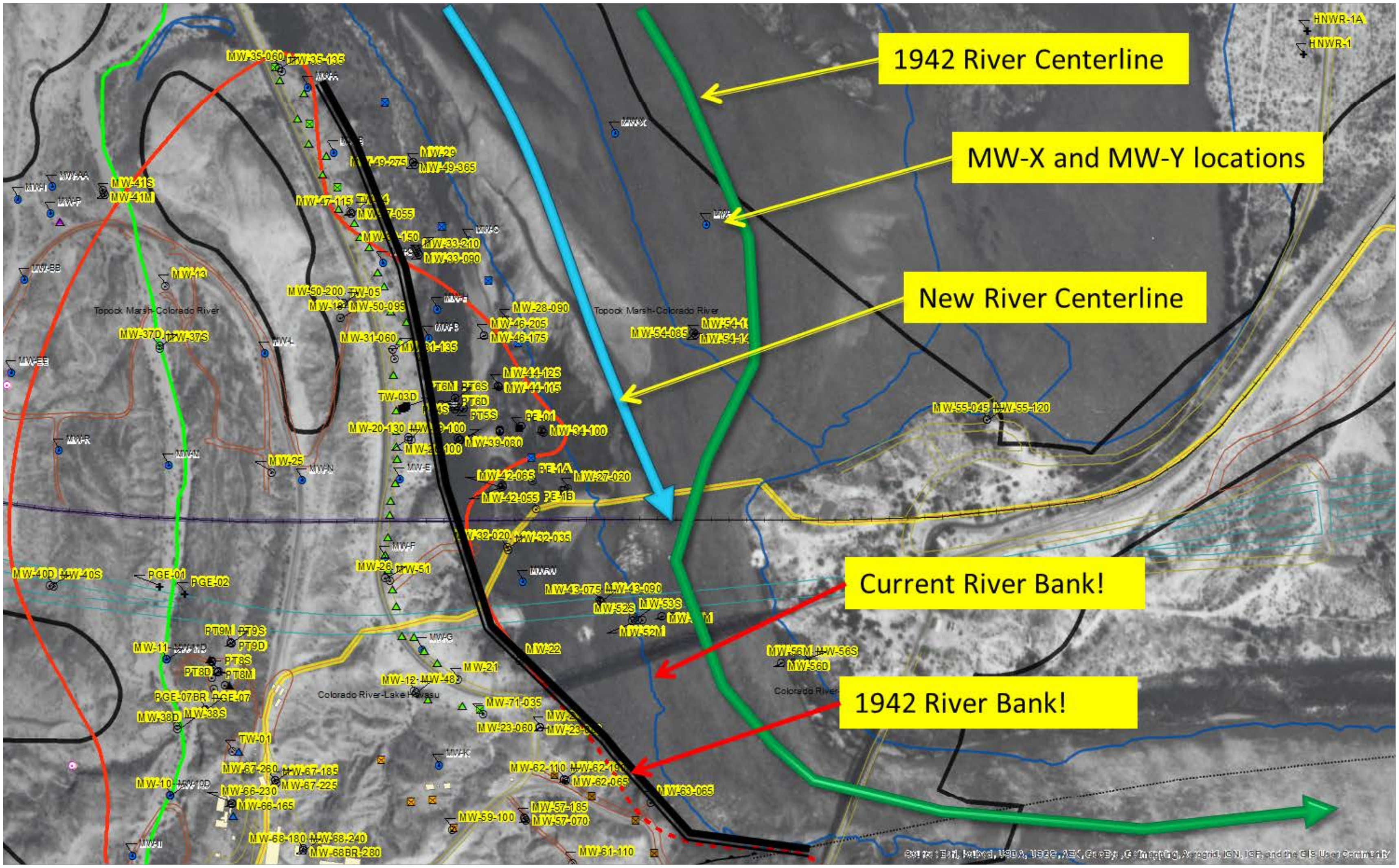


Figure 7. 1942 aerial image with current delineation of monitoring wells and Colorado River/Topock Marsh outline. Note that the River Centerline is actually much further to the east, or right through the proposed locations of monitor wells MW-X and MW-Y.

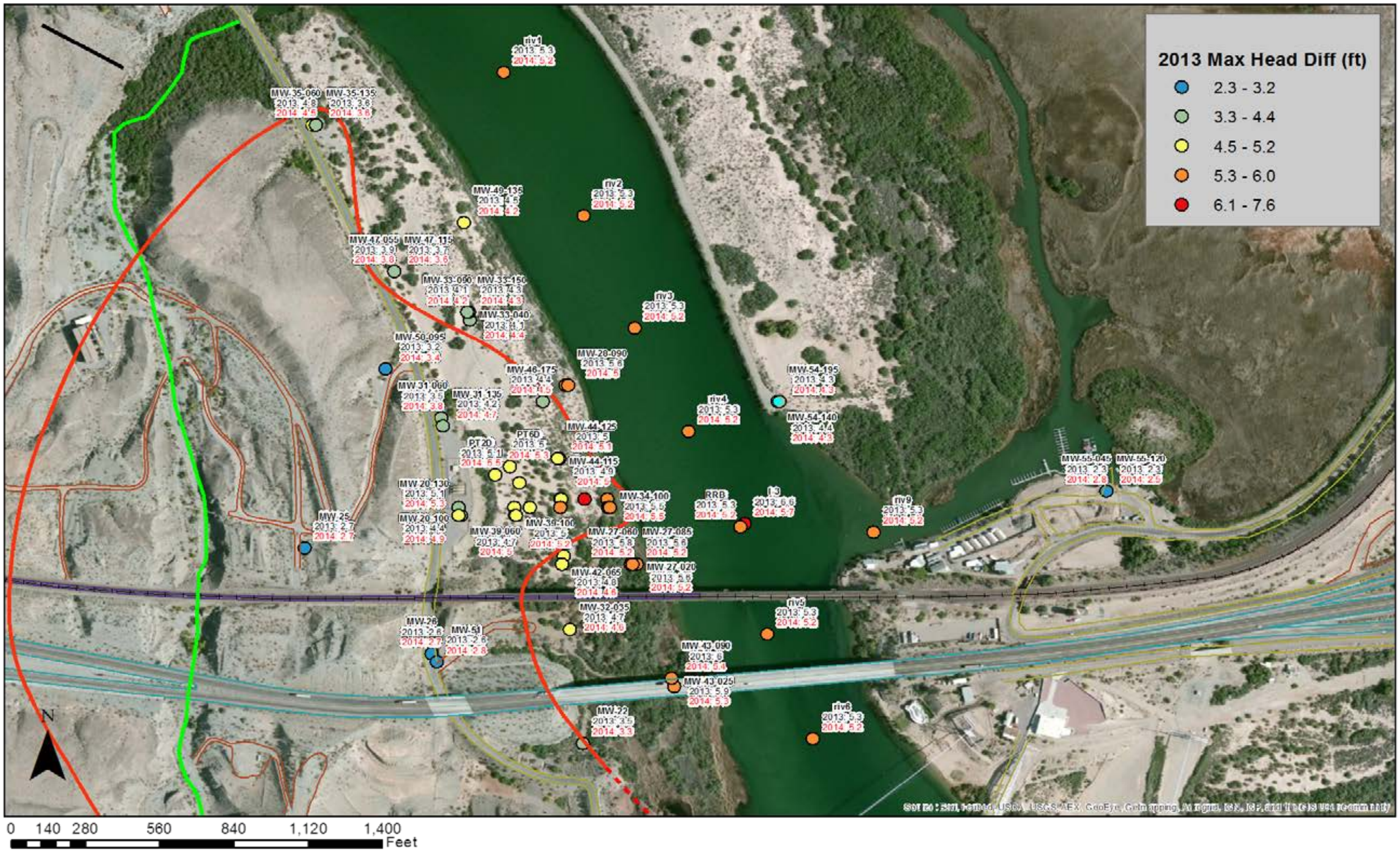


Figure 8. Maximum annual head difference calculated from continuous measurements.[9]

[9] Shows higher fluctuation in IM-3 extraction area better correlated to River stage than other wells with similar distance to riverbank. This implies the River is in greater hydraulic communication with the aquifer in this area, which appears to be an area where the plume has migrated eastward, well south of the proposed locations of monitor wells MW-X and MW-Y and in the pre-dredged area as depicted on Figure 7.

Use and Interpretation of Arizona Groundwater Information Limited

From review of the quarterly IM-3 performance monitoring reports, the following observations have been made:

1) Data from Arizona monitoring wells MW-54, MW-55 and MW-56 are critical to assessing any potential hydraulic connection in groundwater between the two sides of the river.

   i. **Groundwater-Level Data:**

      a. Continuous graphs of hourly corrected heads could not be found for any of these monitoring wells in the IM-3 quarterly monitoring reports, though many others are included relative to river level monitoring well I-3, and annual average values are provided for MW-54 and MW-55. It would be useful to see how their sub-daily groundwater levels respond to Colorado River/Topock Marsh surface water fluctuations.
      b. Though maximum, minimum and average head values are reported for wells MW-54 and MW-55, no values are ever reported for any of the screened intervals in Arizona slant well MW-56, or slant wells in California (i.e., MW-52 and MW-53). These are important locations, especially beneath the river, and should be monitored continuously with transducers, which can be referenced to groundwater elevations by making careful measurements with properly weighted electrical tape measures.
      c. Continuously-recorded water level data could not be found for any other wells in Arizona within the regional model domain, though CH2M Hill (2014c) indicate efforts are being made by PG&E to obtain access to private wells in Arizona. Access to such water level information is important, but would have limited value if only collected once and from pumping wells. Information should also be collected on well pumping details and background Cr(VI) concentrations to support other data in evaluating the hydrogeologic conditions in Arizona and to improve description of the CSM in this area.

   ii. **Aquifer hydraulic properties** – No long term aquifer pumping tests have been conducted at these Arizona wells, probably because extraction could draw Cr(VI) into Arizona. However, conducting a long-term tracer test (see Recommendations section below) could provide valuable information to support parameterization in the model in these areas and to determine the nature of hydraulic connectivity between Arizona and California groundwater.

2) It is unclear what regional wells are currently pumping and potentially influencing groundwater levels near existing monitoring wells MW-54, MW-55 and MW-56. No information was found in any of the 90% BOD documents, or any other reports reviewed. **Figure 20** below shows numerous regional wells obtained from the Arizona Department of Water Resources (ADWR), which

collectively could easily influence groundwater levels at MW-54, MW-55 and MW-56 (and proposed monitor wells MW-X and MW-Y).

Evaluation of Characterizations/Interpretations

To date, characterizations of hydraulic conditions beneath the river and east of it haven't been performed probably due to lack of data, but also because the coupled hydrologic flow system in this area (i.e., 3-dimensional groundwater flow system coupled with the surface water flow system) is complicated. Characterizations (i.e., interpretations of groundwater flow directions) are often aided by iteratively developing and evaluating multiple 3-dimensional CSMs with transient 3-dimensional groundwater modeling, and eliminating alternatives as new data is collected (see Section 5.3 and 5.4 in Neumann and Wierenga, 2003). Such conceptual deficiencies contribute to notable misinterpretations, evident from efforts to contour groundwater levels as discussed below and also typically contribute most to high uncertainty in model prediction (i.e., conceptual uncertainty).

Groundwater Level Contours: A careful review of available reports presenting interpretations of groundwater-level data and contouring resulted in the following observations.

- Meaningful contours cannot be developed from quarterly, averaged heads based on continuously-recorded levels in the presence of such strong river fluctuations. At a minimum, contours calculated over months should not span peaks in river stage, as the actual flow reversals get averaged out. Instead, averages of continuous data should only be done over very short durations (around the peak, or at the low stage) or on just over the rising or falling limbs (longer durations) so that more meaningful flow directions are assessed.

- Some reports include MW-55 and MW-56, but most reports include only MW-54. This results in an incomplete record and requires explanation, which limits development of a more robust CSM in this area of the flow system.

- The configuration of the contours by aquifer layer for different quarterly reports varies significantly. This is most likely due to manual, subjective interpretations by different individuals over time. Why, for example, would not the mid-aquifer depth contours look more like upper layer contours, especially where data are lacking in the middle layer?
- Interpreted 3-dimensional flow paths should be presented to support the CSM. None have been described.

- Though much of the focus has been on horizontal flow gradients, a complete sense of vertical gradients should be assessed during different River stages to get a better sense of how water moves between the different aquifer zones, especially beneath and in the vicinity of the river. This would greatly aid characterization of the groundwater flow directions in 3-dimensions and conceptualization of flow in the vicinity of the River, especially near proposed monitor wells

MW-X and MW-Y. These characterizations are essential to developing a robust numerical flow model whose performance can be verified against this information.

- Simulated contours shown on **Figure 9** appear flawed in Arizona, which we attribute to many factors summarized in a modeling section below. This is compounded by misconceptions with regard to aquifer-River interactions and the overall CSM. Re-contouring as shown using long-term average Arizona values from continuous hourly measurements shows a more realistic conceptualization and better conforms to accepted regional groundwater flow theory.

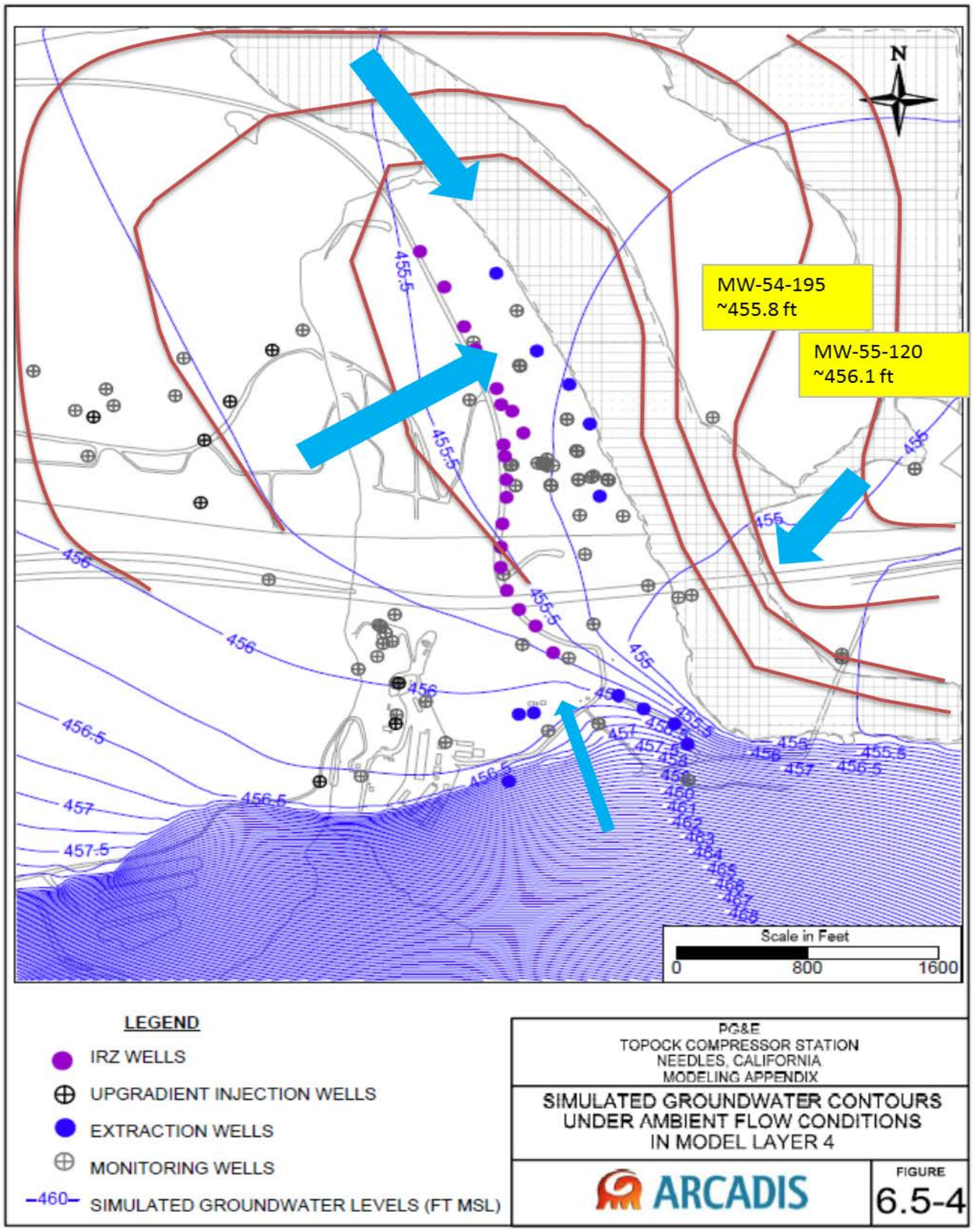


Figure 9. Presumed Average Annual Simulated Head contours for ambient flow conditions (no IM-3 pumping) for the lower aquifer zone.[10]

[10] These contours are lower than average annual heads in lower-screened zones at wells MW-54-195 and MW-55-120, estimated under the potential influence of the IM-3 extraction during 2012 and 2013. Red solid lines denote a reinterpretation of these contours and flow direction (shown as blue arrows) to better incorporate these average annual levels into the simulated groundwater flow. Simulated contours and flow directions do not incorporate the significant model uncertainty. Note that the resulting contour pattern generally reflects a typical conceptualization of regional groundwater flow in a large basin discharging to a river.

The Conceptual Site Model Does Not Adequately Address Areas Beyond West Riverbank

The detailed conceptualization of groundwater flow between the east and west sides of the Colorado River has not previously been a focus of the model. Flows in the vicinity of the River, beneath it and within Arizona are poorly conceptualized. Accordingly, the modeled depiction of the hydraulic conditions beneath the River should be carefully reviewed and modified to more closely resemble actual annual river conditions. In particular, a clear conceptual flow model of the system that fully addresses the dynamic daily and seasonal natural behavior of the aquifer-river flow system should be incorporated into the model as these affect groundwater contouring, which in turn affects conceptualization of flow directions near the River. Developing a 3-dimensional CSM, based on sound characterization of flow and transport, is critical to constructing a reliable and realistic 3-dimensional numerical flow model of the system. Improving this area of the model to produce a more realistic numerical depiction of the area beneath and adjacent to the river is vital for making informed decisions concerning the need for and value of additional monitoring wells, such as MW-X or MW-Y. This is also important because many model results have been presented in the 90% BOD report showing particle paths, concentration distributions, etc. in Arizona, but the associated uncertainties are significant and not explicit in the reporting.

Review of 90% BOD groundwater modeling report (CH2M Hill, 2014d) or related modeling reports revealed no discussion on the characterization or 3-dimensional conceptualization of river-aquifer interaction. These could have encompassed the assumptions and implications to the CSM for parameters like the spatial distribution of hydraulic properties, such as riverbed conductance or horizontal/vertical hydraulic variations beneath the River and their variations in Arizona.

> "*In an area made complex by intersecting alluvial fan and fluvial deposits (both with highly variable hydraulic properties), constantly changing river elevations, and salinity and temperature variability in three dimensions, the model is a simplified version of actual conditions but is considered a valuable tool to apply to evaluation of target pumping rates and remedial alternatives in the immediate site area. Groundwater level changes in response to river fluctuations and to well pumping have been matched to a reasonable degree in areas where data are available.* ***Average groundwater elevations are also reasonably well-matched, given the less reliable data quality****. Simulations of historical Bat Cave Wash discharge have shown general agreement with the current groundwater plume, both in spatial position and in time of travel. As additional information is collected in and around the site, the model will be improved with the new data. Improvements either planned or anticipated for the near future are:* ***(1) calibration to measured heads on the Arizona side of the river;*** *(2) longer-term monitoring of planned injection at IW-2/IW-3; (3) test data from the new PE-1 well near MW-36 in the floodplain; and (4) continuing data collected each month from TW-2D pumping and river fluctuations, including future TW-2D temporary shutdowns.*" [Emphasis added.] [11]

[11] See page 4-1 in CH2MHill, 2005

The reports reviewed also did not discuss subsequent calibration performance and statistics related to Arizona wells. This would be essential information to assess the validity of model predictions such simulated particle tracks for the proposed remediation system design and its operation, contained in the 90% BOD groundwater modeling report (Appendix B). Especially since those predictions are apparently used as the basis for justify the need and locations of planned monitor wells MW-X and MW-Y.

Model Setup is Unrealistic, Uncertain and Unreliable

Only modeling can incorporate all of the complex hydraulic property distributions, combination of complex external stresses (i.e., river fluctuations, pumping, recharge, ET, etc.) and spatial variations in aquifer units (i.e., alluvial/fluvial isopachs and depth to bedrock) in simulating current and future flow conditions that would be influenced by proposed remedial operations. As such, only this tool can provide an adequate basis for determining the need for additional monitoring wells, and if needed, their number(s), locations and screened depth intervals. However a model intended for this purpose would need to be correctly developed and calibrated with estimates of uncertainty to be sufficiently reliable for justifying the need or locations of proposed monitor wells MW-X and MW-Y. This review of the model focused on the MW-X and MW-Y area, and specific model areas which influence current or future simulated flow conditions in this area (i.e., beneath the River and within Arizona).

No single document describes in detail, the development of both the regional microFEM and localized MODFLOW groundwater flow models, all associated setup assumptions, standard calibration details such as Mean Error, Root Mean Square Error, etc.), or even how flow conditions are transferred between these two models (i.e., see 90%BOD DOI comments #429 and #431) . Calibration targets (i.e., average annual heads, monthly heads at selected wells, or localized well shutdown responses) should be provided and shown to be relevant and adequate for the intended uses of the model (i.e., how well does the model reproduce observed remedy performance metrics like hydraulic gradients, flow directions and concentration values or trends as described in the decision/operational framework diagrams shown in Figures 2.2-2 through 2.2-9 in CH2MHill, 2014c). Results of PEST parameter estimation simulations, or specified constraints and their basis could not be found in any available documents, so there is no way to assess parameterization beneath river and east of it, or to assess constraints imposed. Lack of this information makes it difficult to assess overall model performance, for example, the model's ability to reproduce accurate and realistic remedy performance metrics (i.e., observed hydraulic gradients, groundwater flow directions, or concentration trends or values) especially beneath the river and in Arizona proximate to the proposed MW-X and MW-Y locations.

The 90% BOD report (CH2M Hill, 2014a) summarizes modeling Appendix B (CH2M Hill, 2014c), but this mostly discusses the calibrated model, and provides only a brief overview of generalized assumptions on model input. It is neither comprehensive, nor detailed enough to fully assess model calibration performance of either the MODFLOW sub-model, or MicroFEM regional-model. Detailed assumptions, calibration statistics and inputs (i.e., head residuals for all wells, different screened depths, etc.) are not presented. The following is a review of earlier modeling reports issued for the project.

Arcadis (2013) provided 60% BOD modeling file inputs for a specific scenario to Dr. Prucha of the Technical Review Committee (TRC). Dr. Prucha ran this and evaluated both input and output using ESI's Groundwater Vistas program (http://www.groundwatermodels.com/). Some of the input was compared against other spatial data in ArcGIS.

This review indicated a number of reasons, listed below, why the 90% BOD simulated results of future remedial system operation should not be considered reliable enough to justify the need for and locations of proposed Arizona monitoring wells MW-X and MW-Y. The model should be updated and revised using both existing data and new data that could be collected right now (as outlined in the recommendations section below) so that significant conceptual and model input uncertainty can be reduced before attempting to justify two additional monitor wells (MW-X and MW-Y), and before guessing where these should be optimally located and screened for monitoring.

General modeling observations include:

- Two different IM-3 shutdown tests in 2008 failed to demonstrate clear hydraulic response in Arizona monitoring wells MW-54, MW-55 and MW-56. To date, no hydraulic connection, or the nature of such a connection between California and Arizona groundwater has not be clearly demonstrated.
- Water level corrections should incorporate salinity/temperature variations with depth.
- Calibration results are poorly presented. The model inputs should be calibrated against the best available data (IM-3 response to years of extraction and injection).
- Specific input details, assumptions and results of post-60% BOD modeling updates were not provided for tribal review, which limited any evaluation of simulated flows within Arizona, and in proposed monitoring locations MW-X and MW-Y.
- Effects of the extraction of Arizona groundwater (Site B, HNWR-1 or HNWR-1A) e on groundwater conditions at MW-X and MW-Y appears unrealistic and uncertain.
- Various model inputs are unrealistic or unjustified near the river and in Arizona:
    - Model layers do not correlate with hydrostratigraphic unit (HSU) contacts.
    - Evapotranspiration representation should be more realistic.
    - River-aquifer exchange should reflect natural conditions.
    - Recharge input parameters should be more realistic.
    - Distribution and magnitudes of hydraulic conductivity beneath river and in Arizona show considerable variations over many orders of magnitude in areas where no data exists – likely due to poorly constrained automatic parameter estimation.
- Simulated mass balance and head contours appear unrealistic.
- Bedrock depths in the model in Arizona appear inconsistent with other reported depths (Richard et al, 2007).

- Density-dependent flow conditions are not simulated, which affects predicted flow conditions near MW-X and MW-Y.
- Groundwater pumping effects at either the regional model, or sub-model boundaries may not be adequately accounted for in the model, which can affect flow conditions near MW-X and MW-Y.
- Calibration results, especially in Arizona wells, are questionable for intended purposes.

Hydraulic Property Distributions Unrealistic/Poorly Justified

Subsurface hydrogeological model inputs on the Arizona side appear to be based on very limited data for aquifer hydraulic conductivity, storage parameter distributions, and HSU thicknesses. The implications were never assessed on future predicted flows beneath the River, or in Arizona with all of the complicating time-varying stresses such as fluctuations in the River and Topock Marsh area, and existing/future groundwater extraction in Arizona.

Figure 10 below (CH2M Hill, 2014c) shows a very complex distribution of hydraulic conductivity for one model layer (3), which strongly controls lateral groundwater flows beneath the River and vertical flows beneath the River and water exchange between the River and the aquifer. While distributions may actually vary orders of magnitude, the abrupt changes and lack of any data beneath the River indicate that this is unrealistic and non-unique. Though the authors indicate it was derived for each layer through use of a parameter estimation code, unless highly constrained, these tools do nothing more than generate non-unique or "guessed" distributions. Use of the PEST program is not unreasonable, but it is incumbent upon the modeler to clearly convey the implications of the non-uniqueness and implications on the model predictions. The modelers made no attempt to evaluate the validity or range of implications of these assumed significant variations in hydraulic conductivity on model predictions, particularly related to simulated flow paths (particle tracks), which appear to break through the riverbank extraction well network. This is analysis is used as the primary justification for siting of proposed monitor wells MW-X and MW-Y. Any simulations or modeling performed within this area of loosely assumed parameters should be clearly presented with strong qualifiers that these results are at best a gross estimation of how the natural system might actually respond. Accordingly, the current model should **not** be used to determine locations, numbers, or depths of monitoring wells including proposed monitor wells MW-X and MW-Y. The number, locations, screened depths of any monitoring wells in addition to MW-54, MW-55 and MW-56 should not be proposed based on results from this model until it is corrected and better calibrated using all available existing data (IM-3 system), and potentially new data are applied as suggested below.

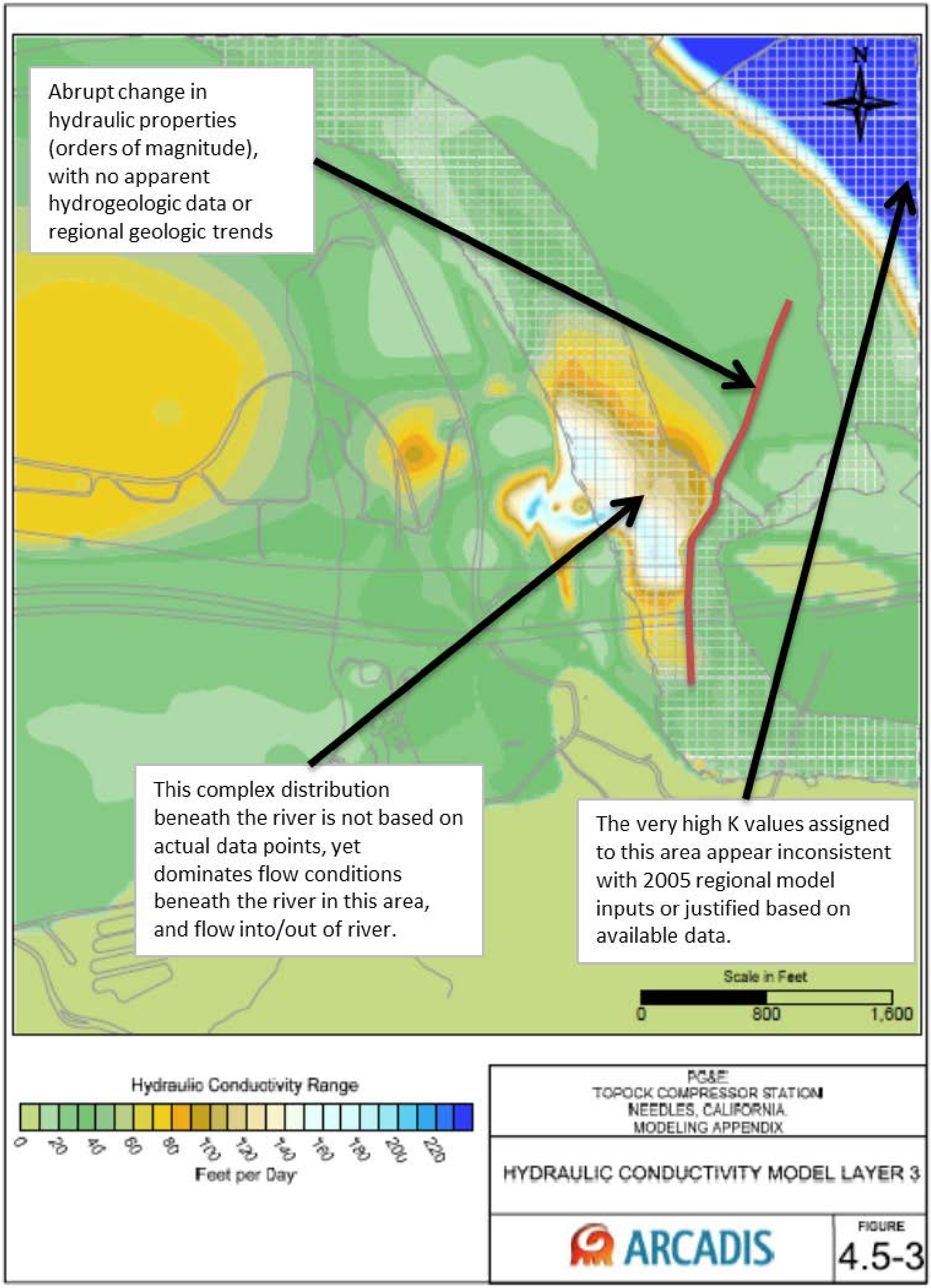
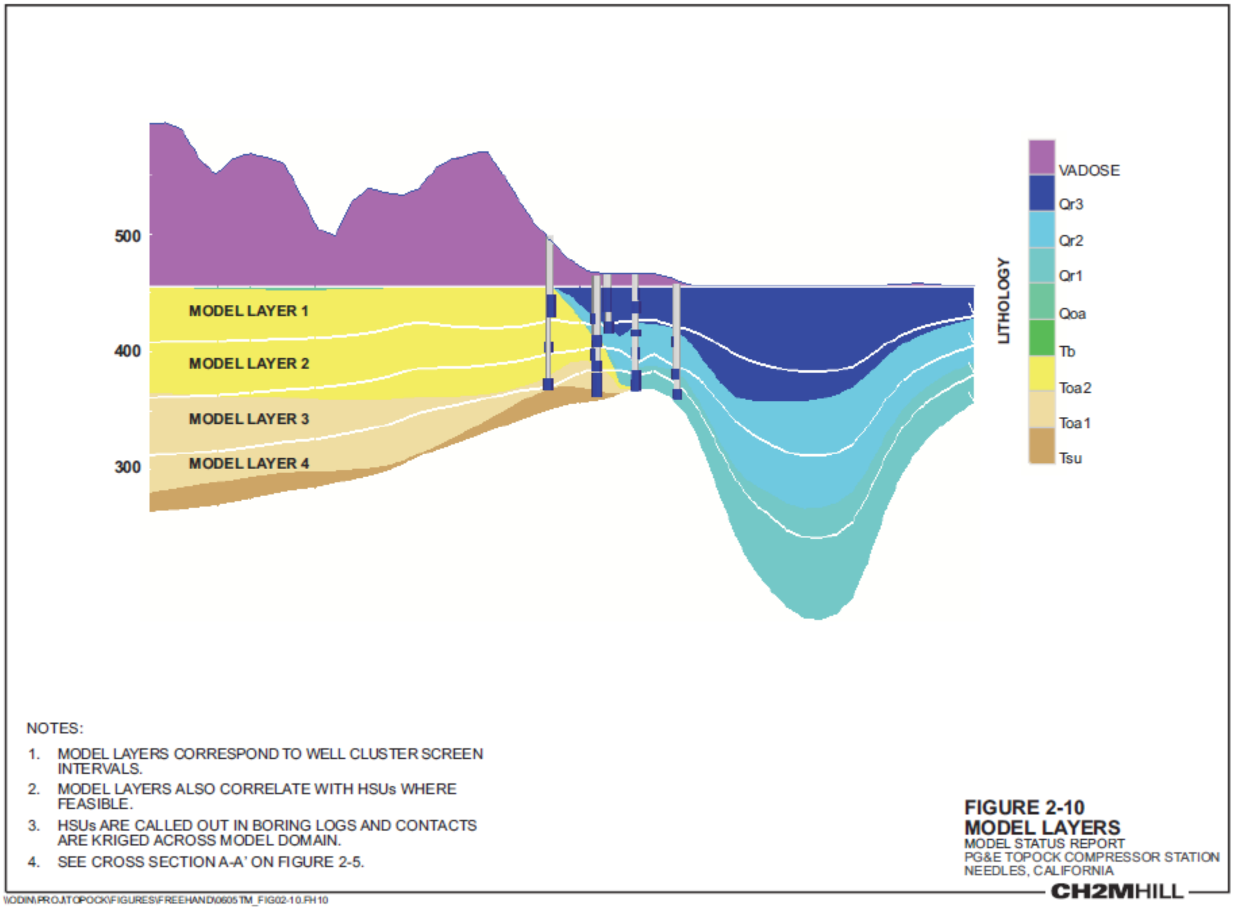


Figure 10. Hydraulic conductivity values used in Model Layer 3, and several unrealistic aspects of the distribution/magnitudes.

Model Layers

Figure 11. Model layers do not follow hydrostratigraphic unit (HSU) contacts (see Figure 2-10 below, CH2MHill, July 2005), especially beneath the river. See 90% BOD TRC comment #60.



The conclusion drawn from this figure is that this model structure reduces the ability of the model to correctly simulate flow beneath the river, or the interactions between groundwater and river water. More importantly, lumping important hydrogeologic properties based on well screen intervals instead of hydraulic properties strongly affects fate/transport simulations. This also renders the results of flow and fate/transport modeling beneath the river and into Arizona unreliable. The analysis should follow HSUs, even adding more layers, especially for fate/transport, to better simulate 3-dimensional flows and contaminant transport.

The top layer is modeled as unconfined, using surface topography everywhere, except over the river, where it uses the average river surface water, including the Topock Marsh. This incorrectly simulates porous media flow in the area between mean surface water and the river bathymetric surface, despite controlling flows in and out of the river with the river package. Actual river bathymetry should be used for the top model layer surface to correctly simulate heads and flow paths within the system in this critical area.

Boundary Conditions Poorly Prescribed

Groundwater Recharge Unrealistic

Groundwater recharge is specified as zero everywhere in the model, except for a few cells along the south in the Chemehuevi Mountains (mountain front recharge). Specification of recharge cells appears inconsistent with literature on where and how focused recharge occurs in mountain front/stream-bed areas in semi-arid/arid environments (see Simmers, 1998). In the Bat Cave Wash drainage, highly focused, efficient recharge in the mouth of the highly permeable (gravelly), widening streambed is very evident, but no recharge is specified here, where it would be most expected. The Bat Cave Wash has a very extensive watershed (more than 5 miles long, and greater than 4 square miles). Instead it was specified in impermeable exposed rock ridge areas, where recharge would likely be near zero. It should be applied in drainages where focused runoff meets permeable alluvium, especially in Bat Cave Wash adjacent to the Compressor Station.

No-Flow Lateral Flux Boundary Conditions Specified from Regional to Sub-Model

Review of 60%BOD Modflow model input, and 90%BOD PG&E response to comments (#429 and #430, or DOI-49 and DOI-50 and #425 – FMIT) suggests the Sub-Model boundaries are specified as No-Flow. This implies that lateral inflows or outflows from the regional model are not transferred from the Regional model to the Sub-Model, which will influence flow conditions in the MW-X and MW-Y area.

Specification of River in Model Unrealistic

The following observations were made with regard to the conceptualization of the River within the model.

- River cells appear missing in critical areas (see **Figure 12**, below). This is an important oversight which will affect simulated groundwater levels, flow paths and magnitudes in the northern portion of the local MODFLOW model. This will directly affect simulated flow paths from freshwater injection, flow beneath the River and simulation results for groundwater in Arizona. Without correctly simulating these boundary conditions, the model will not produce realistic predictions, and should not be used as a basis for justification for the AZ monitor wells MW-X and MW-Y.

- Specification of river cells does not accurately reflect current or future bathymetry or surface water levels in the Topock Marsh. Constant river stage (455.1 ft, msl) and river bottom (452.1 ft, msl) elevations were specified over the entire Topock Marsh (see **Figure 13** below). But aerial images clearly show only a smaller surface flow channel is present in the area, as the U.S. Fish and Wildlife Service (USFW) closely controls discharge via the South Dike control structure

(USFWS, 2006). A sonar-derived bathymetric map was derived for the Topock Marsh, north of the southern outlet control (http://proceedings.esri.com/library/userconf/proc99/proceed/papers/pap396/p396.htm). Based on the constant elevation prescribed in the local MODFLOW model in the Topock Marsh area near the Golden Shores Marina (south of the controlled marsh area), the microFEM regional model likely also prescribes a simplistic, constant bathymetric surface north of the control structure. It is important to specify the correct bathymetry as it controls the spatially variable simulated influx of surface waters in the marsh to underlying groundwater as a function of depth of water in the Marsh. This is not likely critical to simulating flows in the immediate area of the proposed remedy on the California side. However, this will be important in simulating 3-dimensional groundwater flows on the Arizona side, especially considering planned long-term extraction at wells HNWR-1A and/or Site B. These impacts, along with other Arizona extraction could influence water levels and interpretations of flow direction at the proposed locations of monitor wells MW-X and MW-Y.

- The river stage was set to a uniform value for all of Topock Marsh, which is clearly dry much of the year now due to the controlled discharge at the southern end of the South Dike (USFWS, 2006). Recent 2014 aerial images (ArcGIS World Imagery) show the discharge control structure and lack of standing water. This area in the model should be simulated using the MODFLOW ET module so that a constant river stage does not dominate groundwater levels in the area. Realistic stage levels in this area should be specified.

- Steady stages in the river and marsh do not allow adequate calibration of the model parameters and do not correctly simulate the actual water conditions within the system, or potential pathways. Appropriate fluctuating daily and seasonal river levels and Topock Marsh levels should be imposed in the proper areas of the model for transient simulations to correctly simulate groundwater levels and flows (3-D paths and magnitudes). Water levels within the Topock Marsh are controlled by the outlet structure and are fairly-well known based on available graphs (USFWS, 2006).

- Riverbed conductance (vertical hydraulic conductivity divided by assumed streambed thickness and multiplied by flow area) controls the rate of flow between the River and underlying aquifer. Conductance values were obtained from the 60% BOD Report (CH2M Hill, 2014d) MODFLOW input files provided by Arcadis (July 2013, Jonathan Roller at Arcadis). A plot of the riverbed conductance values (**Figure 14**) shows an interesting distribution, which was never reported. The distribution is complex, with the highest values adjacent to the East Ravine discharge area, lower values along the eastern side of the river, and the lowest values in Topock Marsh and just east of the IM-3 extraction wells at PE-1/TW-03D (central river). This may explain how simulated drawdown somehow propagates from these extraction wells toward MW-54-195. The riverbed conductance distributions here are based on estimates derived through PEST simulations rather than using actual measurements. This distribution is critical to controlling what flows between the River and Topock Marsh surface waters and underlying groundwater. It also plays a critical role in determining how influential the river itself is in acting as a hydraulic barrier to flow between Arizona and California.

- A sensitivity evaluation of riverbed conductance does not appear to have been performed. Here, a "sensitivity evaluation" means varying assumed spatially distributed values over a range that is physically-realistic. Without conducting a sensitivity analysis, the modeled conductance distribution is a significant assumption directly influencing important predictions in the model (i.e., RAO #2 flows into the River), which underpin the entire conceptualization of how the river water flows through the aquifer, 3-dimensional flow paths near and beneath the River/Topock Marsh, etc. At a minimum, the basis and conceptual rationale for the conductance distribution should be presented in detail before relying on it to assess hydraulic connection beneath the river (i.e., for IM-3 testing) and for future predictions of performance with the full remedial system in operation. The conductance distribution and the magnitudes have a direct bearing on whether proposed monitor wells MW-X and MW-Y are needed, and, if so, where they should be placed.

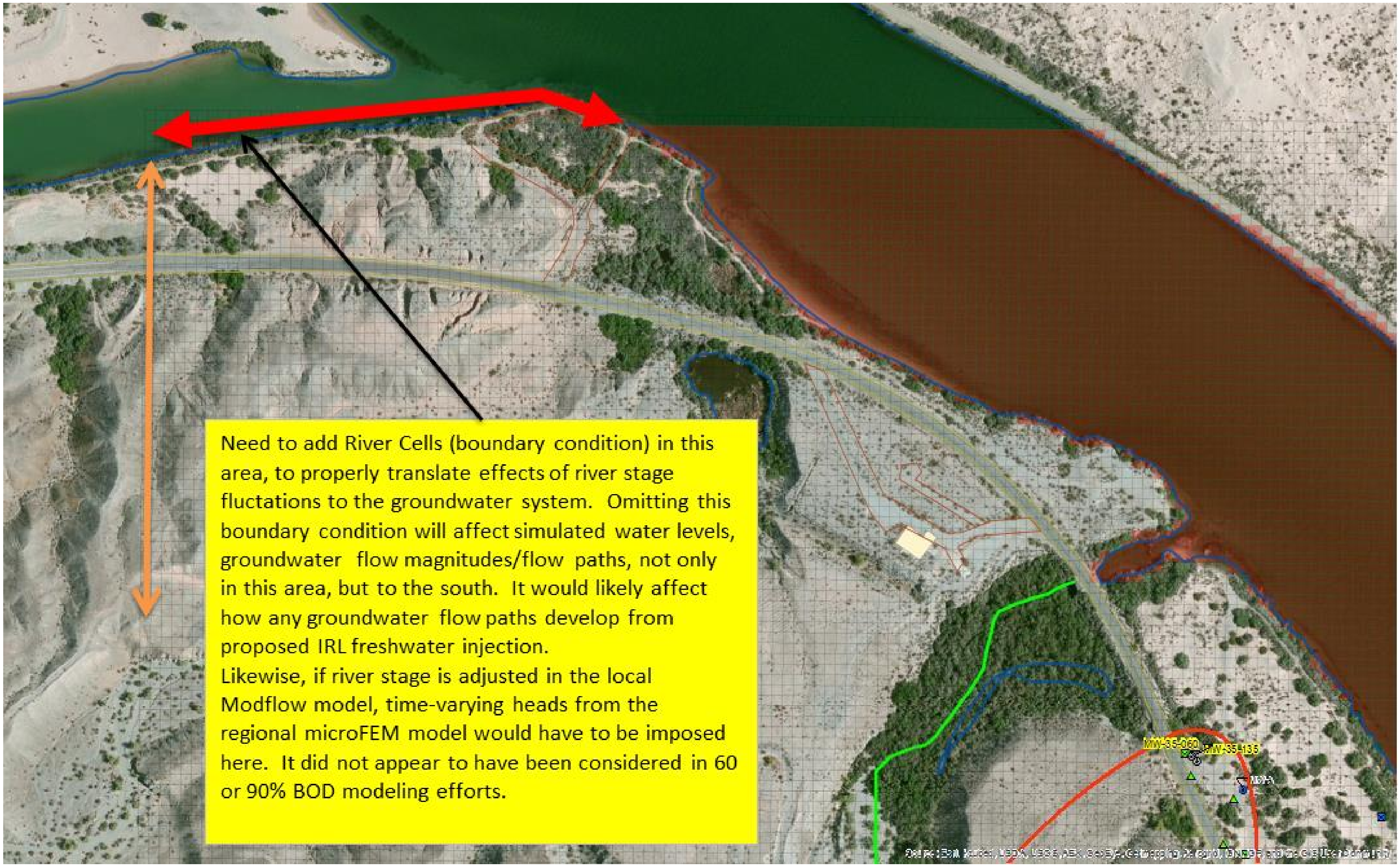


Figure 12. 60% BOD MODFLOW model "River Cells" (in red), which align with the river boundary, except along the northern edge (red arrow) where Beale Slough joins the River at Park Moabi. This slough should have had river cells in order for the model to correctly simulate river-aquifer flows and fluctuations (model cells shown in site ArcGIS document developed for the site).

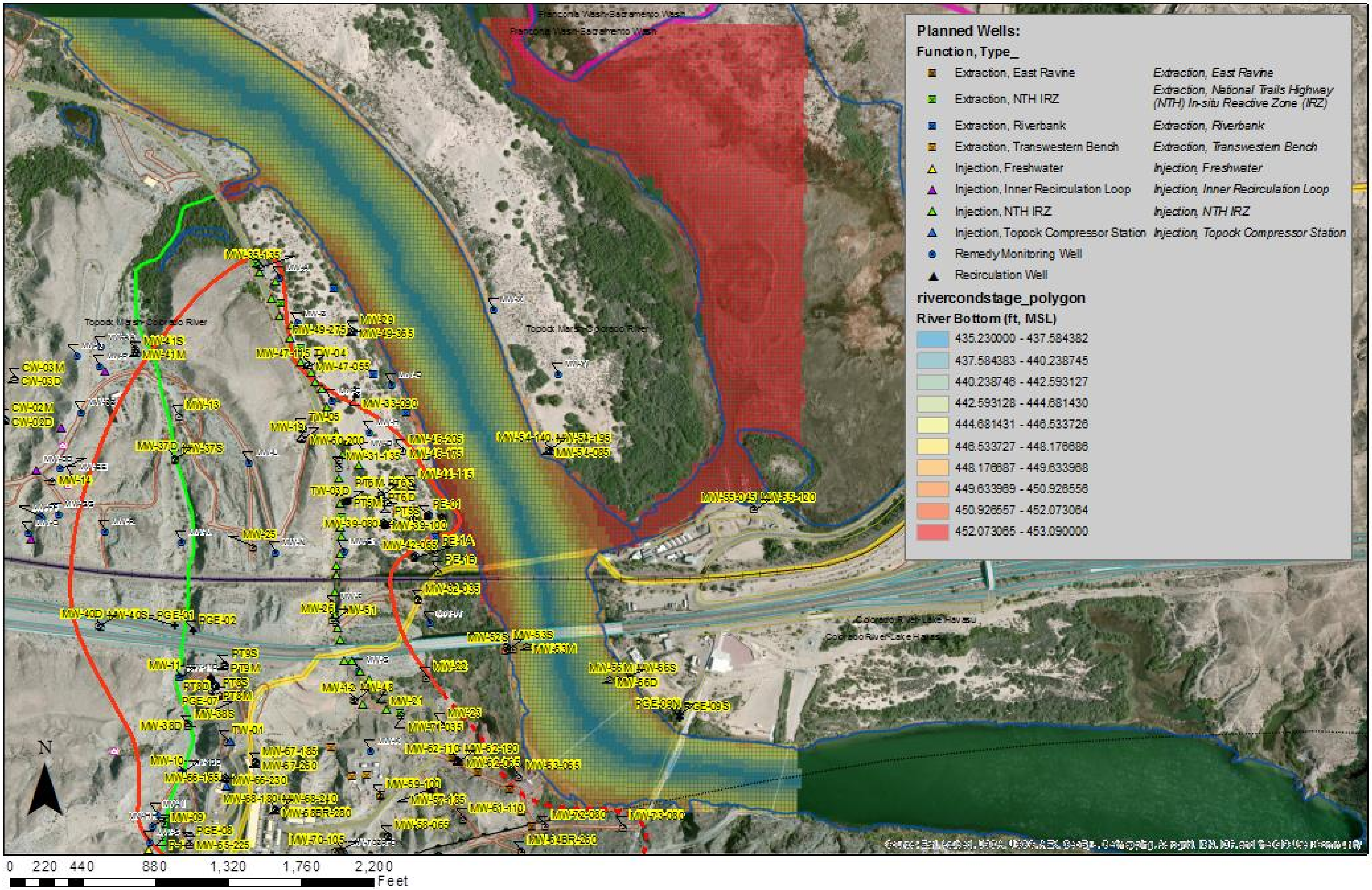


Figure 13. River bathymetry (bottom depth) is deepest in center, but it is unclear if bathymetry used in the model reflects all the actual measurements done in this segment of the river (data from Jonathan Roller, Arcadis July 2013 – 60% BOD MODFLOW Input Files).

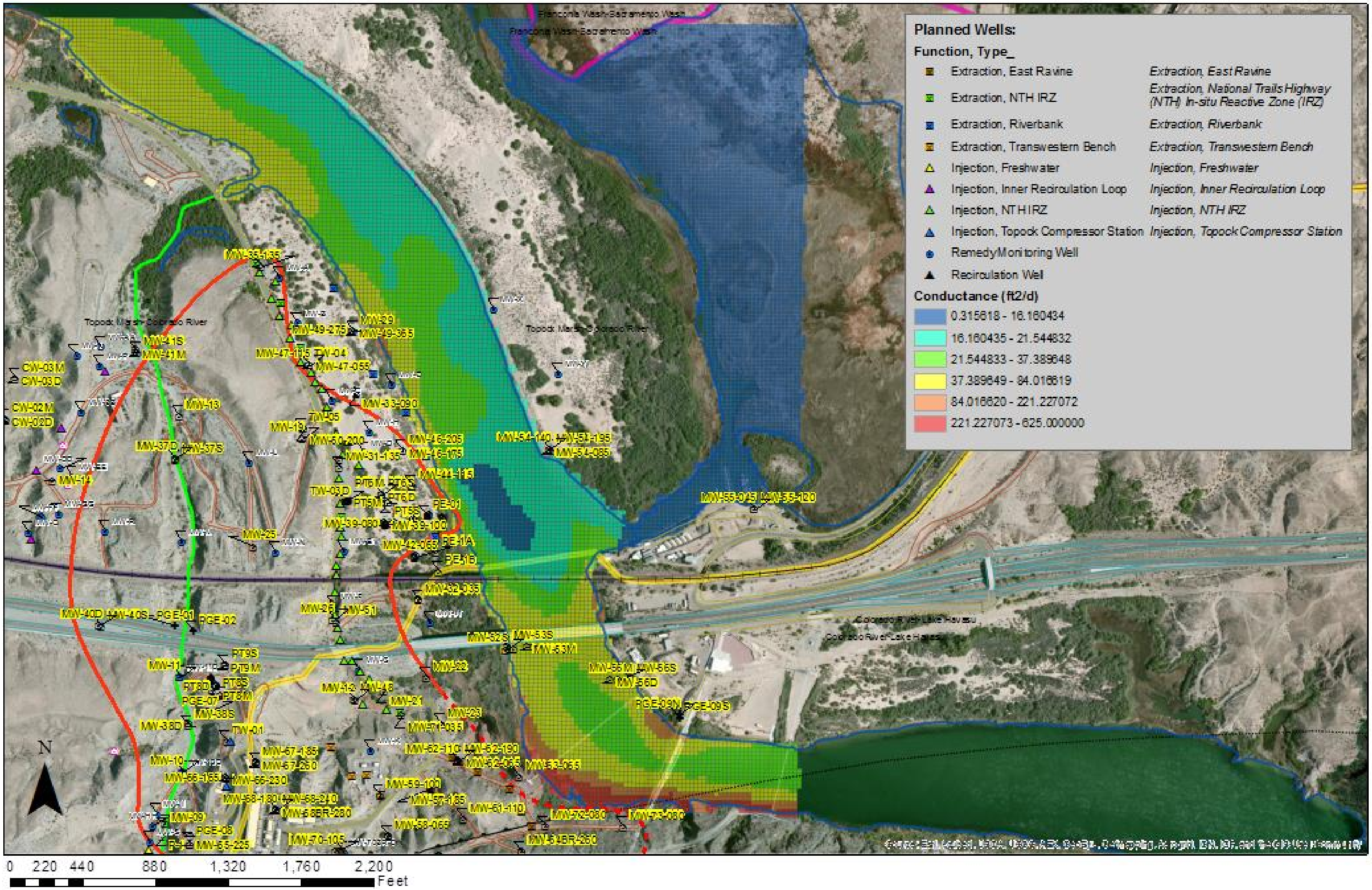


Figure 14. Specified river conductance values (ft^2/d). Note the higher conductance values on western bank, very high values along the western bank of East Ravine, low values just east of IM-3 Extraction wells (PE-1 and TW-03D), and low values in Topock Marsh.

Actual Evapotranspiration (AET) from Groundwater Unrealistic

The MODFLOW model specifies three evapotranspiration (ET) zones – phreatophytes, the River and everything else, though only two are indicated in the 90% BOD report. It is appropriate that ET in the river be zero. But the phreatophyte zone does not capture all variability in phreatophyte vegetation coverage with ET Cells **(Figure 16),** and does not capture differences in arid zone vegetation, which have different rooting and transpiration depths. Most of the lower Topock Marsh (near Golden Shores Marina) is assigned zero ET, because it is simulated as a river. Instead it should be simulated using realistic ET values. This will impact flow conditions along the AZ river bank and has implications for propagating effects from pumping at from HNWR-1 and/or Site B.

The July 2005 update report on modeling (CH2M Hill, 2005) states the following:

> "*Evapotranspiration (ET) losses occur in the floodplain areas and Topock Bay/Topock Marsh. An average maximum ET rate of 0.42 in/yr was assigned to all model nodes except those in the river. This rate was not designed to correspond to published plant ET rates, but as a value averaged over nodal areas which consist of both bare soil along with plant growth*."[12]

However, the 60% BOD report (CH2MHill, 2013) showed two different zones were used to define Actual Evapotranspiration (AET) rates; one for phreatophytes (4.2 in/yr) and the other for non-phreatophytes (0.42 in/yr). The specified AET rate of 4.2 in/yr (0.35 ft/year) for phreatophyte zones seems excessively low as noted in TRC 60% BOD comment (#365). Hill (1993) indicates that AET rates in a comparable region (Yuma) should be more like 3.5 to 7 ft/yr. The phreatophyte zone with a higher specified rate shows dense coverage, but seems to omit important areas of the model which occur in phreatophyte areas within the Topock Marsh. In the graph below (**Figure 15**), AET rates are plotted for different riparian vegetation from Hill's (1993) report, and the graphs clearly show that the AET should be several orders of magnitude higher than what has been used for the Topock MODFLOW model. The model predicted AET loss of 140 ac-ft/year to phreatophytes is likely vastly underestimated, by at least an order of magnitude for this area.

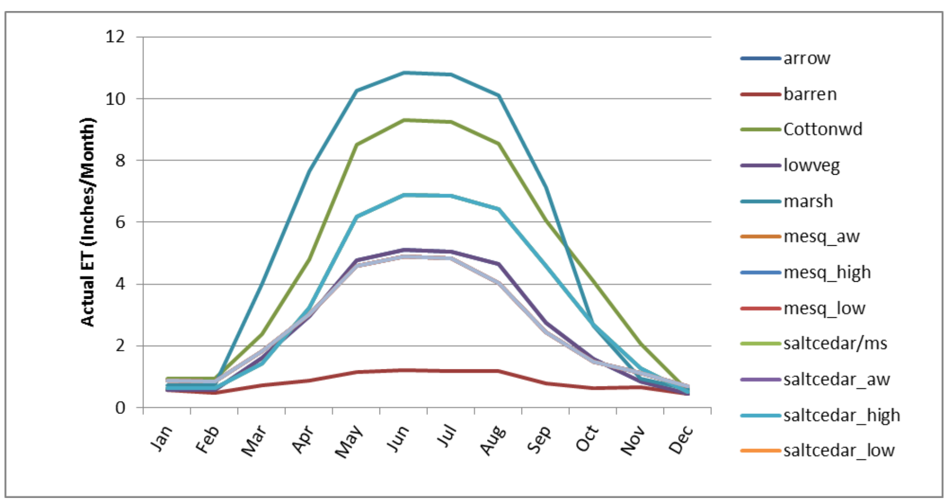


Figure 15. Phreatophyte water use by type.

[12] Note: in/yr = inches per year; ft/yr = feet per year; ac-ft/yr = acre-feet per year (approximately 326,000 gallons)

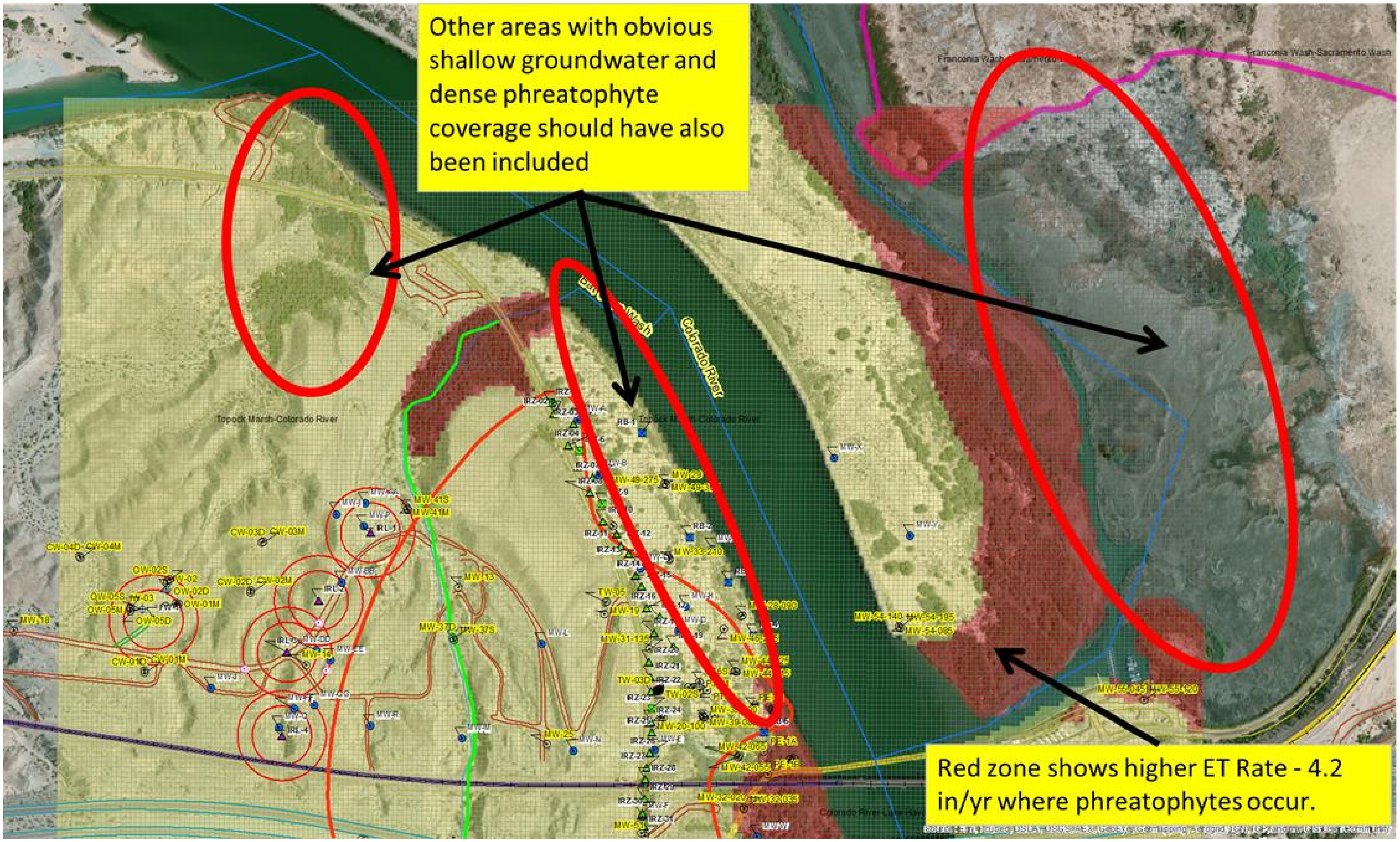


Figure 16. Project MODFLOW model ET zones, where red has a higher rate (4.2 in /yr) for phreatophytes, and 0.42 in /yr everywhere else except rivers. Figure developed in ArcGIS, using data from Jonathan Roller, Arcadis July 2013 – 60% BOD MODFLOW input files.

The Evapotranspiration "Extinction Depth" specified in the model (10 ft), which effectively represents the maximum depth that phreatophyte roots would withdraw water, appears too low and instead should be at least 20 to 30 feet (see Hill, 1993). Other sources suggest this could be as deep as 50 feet (see Table 1 on page D54, Anderson and Freethy (1995), depths from 0 - 50 feet, and ET maximum rates from 3 to 10 ft/yr at 100% density). The density of phreatophytes from aerial imagery appears to be very high. No technical basis for the 10-ft extinction depth is offered. Setting the extinction depth too low reduces the distributed groundwater discharge to phreatophytes, and also affects the 3-dimensional flow paths in the shallow aquifer. Thus, instead of all groundwater moving towards the river, it would be redirected locally towards phreatophyte areas, which were not well-defined to begin with (see discussion above).

Simulated Water Balance Components are Questionable

Other regional studies suggest the water balance results summarized in the 2005 modeling report (Figure 2-14 in the CH2M Hill, 2005) suggest the evapotranspiration from the regional model (**see Figure 17**) is likely much too low (owing to deficiencies noted above). Table 21 (below) in Owens-Joyce and Raymond 1996 (USGS paper) reports AET by phreatophyte density, by month in Mohave Valley.

Table 21. Water-use rates for vegetation types and densities along the lower Colorado River, 1984, calculated by the Lower Colorado River Accounting System

River reach and vegetation type	Monthly water-use rate, in feet												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Hoover Dam to Davis Dam—Willow Beach, Arizona[1]													
Phreatophytes													
Medium	0 00	0 22	0 41	0 48	0 72	0 75	0 81	0 73	0 62	0 33	0 21	0 00	5 28
Sparse	00	18	32	38	57	60	65	58	50	26	17	00	4 21
Mohave Valley—Bullhead City, Arizona[1]													
Alfalfa	00	31	56	66	97	1 00	72	70	82	44	14	00	6 32
Cotton	00	00	00	05	19	44	70	92	68	28	00	00	3 26
Wheat	14	27	75	86	30	00	00	00	00	00	00	00	2 32
Phreatophytes													
Dense	00	28	52	61	90	92	1 01	92	77	41	25	00	6 59
Medium	00	24	43	51	75	77	84	76	63	34	21	00	5 48
Sparse	00	19	34	41	60	62	67	61	51	27	17	00	4 39

In fact, Guay, et al., (2006) state*: "In summary, Mohave Valley is a losing river reach where Colorado River water is later lost to ET and open water evaporation."* This implies that ET is so significant that there is a net recharge from Colorado River leakage into the aquifer, whose levels are being strongly controlled by the phreatophytes and direct evaporation from open waters in the area. This is actually opposite from what is stated in the CSM and simulated in both the regional and local models, where the river is acts a net annual sink or discharge feature in the system.

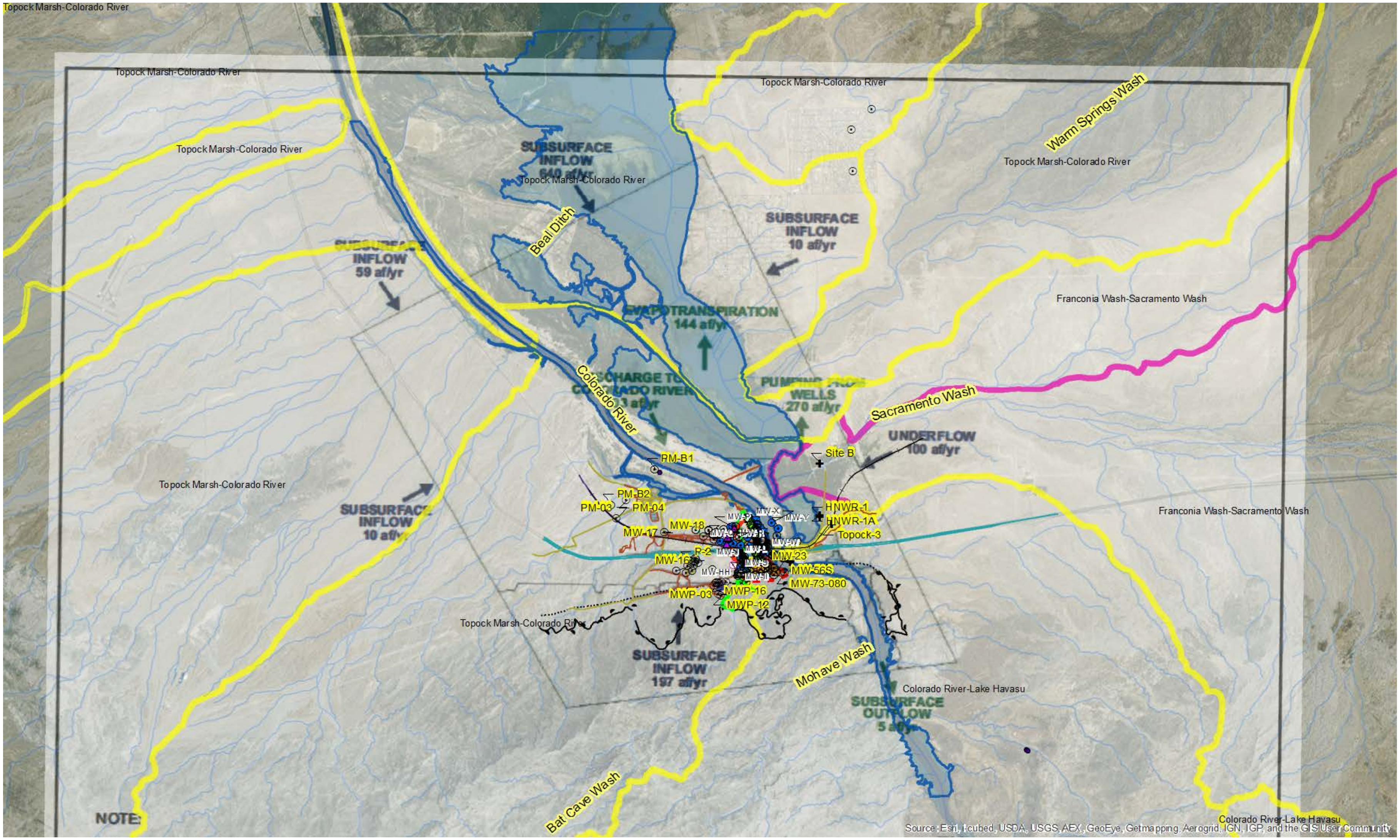


Figure 17. Shows Evapotranspiration of 144 ac-ft/yr from groundwater(Figure 2-14 in the CH2M Hill, 2005). This is likely much too low over this spatial extent. Subsurface “underflow” of 100 af/yr from Sacramento Wash is much less than the 2,400 ac-ft predicted by a recent USGS report (Tillman et al, 2013).

A water budget from a detailed USGS study (Table 10 below from Tillman et al, 2013) of the Sacramento Wash, Hualapai and Arizona Lake Mohave Basin indicates the groundwater discharge through unconsolidated deposits within Sacramento Wash is much higher (at least 1 order of magnitude) than the 100 ac-ft/yr simulated with the regional microFEM model as summarized on Figure 2-14 (i.e., 2,440 ac-ft/yr to 5,600 ac-ft/yr from Sacramento Valley in Table 10). The significantly underestimated maximum ET rate and ET extinction depths noted above likely vastly under predict the actual ET in this area, which would have reduced the 2,440 ac-ft/yr inflows, though recent fires in the lower Sacramento Wash by the USFWS would reduce the AET. In any case, higher subsurface inflows and ET losses should be simulated where they occur as they dictate flow conditions and pathways in the proposed MW-X and MW-Y monitoring locations.

Table 10. Simulated predevelopment groundwater budget for runoff-recharge scenario.

[Values are in acre-feet per year; –, no data]

Water-budget component	Detrital Valley	Hualapai Valley	Sacramento Valley
Inflow from natural recharge	1,870	3,680	6,720
Inflow from adjacent valleys	0	50	1,310
Inflow at Truxton Wash (Hualapai Valley only)	–	800	–
Net outflow to Colorado River	1,780	4,500	2,440
Outflow to adjacent valleys	95	40	[1]5,600

[1]Outflow from Sacramento Valley to Lake Mohave Basin discharges to Topock Marsh and the Colorado River near Topock.

Bedrock Depths Appear Inconsistent

The basis for the modeled bedrock depth in Arizona could not be determined in available reports. The surface appears to be somewhat inconsistent with other reported surfaces (Richard et al, 2007). This would influence simulated groundwater flow gradients/directions in Arizona, especially responding to well production and river fluctuations. The source of information and assumptions used in developing the bedrock surface in the model(s) should be provided to the Tribes for review.

Density-Dependent Flow is Not Simulated with MODFLOW Code

The MODFLOW code does not simulate density-dependent flow, which introduces additional errors in predicting 3-dimensional flows within the model domain, where higher density waters are present. DOI comment #9 on the 90% BOD Appendix B points out that high density dissolved solids concentrations can result in errors predicting flows and can produce uncertainty in capture zone analysis. Simulating the correct flow dynamics of relatively high density variations beneath the river, with strong driving river stage fluctuations, requires a more appropriate modeling tool, especially if the model is going to be used as the primary technical basis for locating and specifying parameters for additional monitor wells such as MW-X and MW-Y. Many codes have the capability of simulating the density-dependent flow conditions (see https://www.twdb.texas.gov/innovativewater/bracs/doc/bracs_gw_model_rpt.pdf for a list of codes).

Groundwater Pumping Effects at Model Boundary

It is unclear whether time-varying effects of all regional groundwater pumping effects both within the regional MicroFEM model and outside are actually incorporated into the model, particularly in the Arizona side. **Figure 18** below shows the local MODFLOW boundary (black box) and the eastern boundary of the MicroFEM regional model with an orange line. Review of earlier modeling reports (CH2M Hill, 2005) indicate that pumping from some of these wells was incorporated into this model (i.e., the Golden Shores community wells to the north) by using a single representative well. Though this appears reasonable, it is unclear whether effects of the groundwater pumping at wells outside of the MicroFEM boundary, but still close enough to affect flow conditions at or within the MicroFEM model boundary were incorporated into the internal modeled flow conditions. In addition, as DOI points out in 90% BOD comments 14, 15, 16 and 41, the proper translation of groundwater pumping effects and other dynamic boundary conditions as a dynamic flux boundary condition from regional MicroFEM model to the local MODFLOW model should be confirmed.

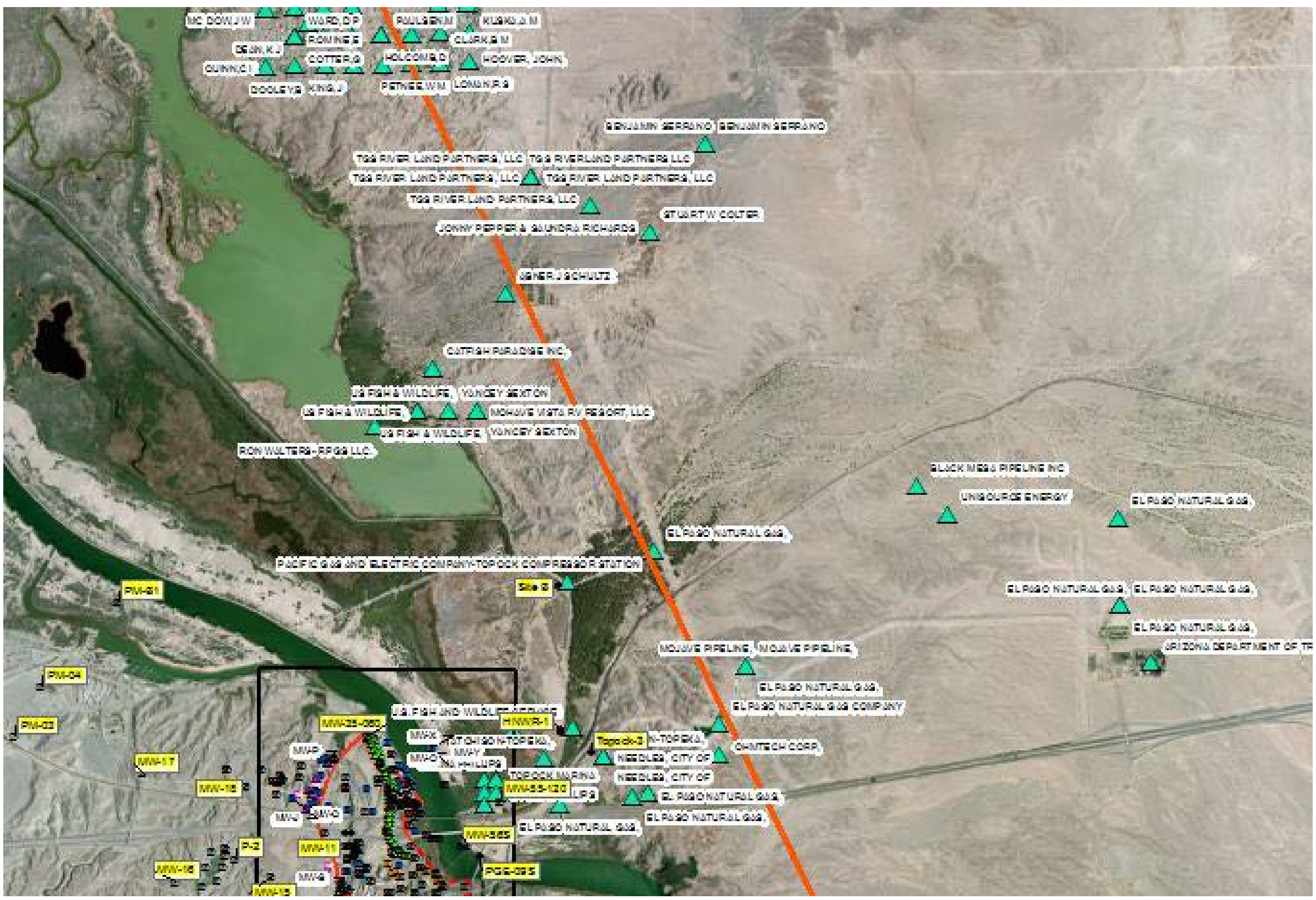


Figure 18. Regional wells from Arizona Department of Water Resources registered well database. Most can be assumed to be pumping, though this information was not reviewed any further than plotting locations here. Figure developed using ArcGIS project file with imported ADWR data.

September 2008 IM-3 Extraction Well Shutdown Test Fails to Demonstrate Hydraulic Connection in Groundwater Between California and Arizona.

CH2M Hill (2009, Appendix E, page E-1) states:

> "*The California Environmental Protection Agency, Department of Toxic Substances Control requested that demonstration of model accuracy be performed by using the model to forecast the hydraulic data collected after the calibration period (between 2005 and 2008). Specifically, the Technical Work Group agreed that the validation should consist of comparing simulated data to: (1) the monthly average groundwater levels in monitoring wells in response to changing monthly average river levels, and (2) the response of Arizona wells in the MW-54 cluster to the May 2008 Interim Measure No. 3 (IM No. 3) pumping shutdown event. However, **due to anomalous river** levels during the deconvolution fitting period of the May 2008 IM No. 3 shutdown, detection of well response in the MW-54 cluster (located across the river in Arizona) was incomplete. As a result, a second IM No. 3 shutdown event was simulated with the model in September 2008, and improved results were obtained. The September 2008 evaluation was conducted in response to a United States Department of the Interior (DOI) comment on Appendix C of the Draft CMS/FS Report*" [Emphasis added.]

CH2M Hill (2009, Appendix E, page E-3) states:

> "*Figures E-2c through E-2g show the deconvolution analyses for the MW-54 and MW-55 wells in Arizona. In general, the detection limit for observable water-level fluctuation was estimated to be 0.1 foot; however, the detection limit for water level change in the MW-55 well cluster was estimated to be 0.05 foot due to a less noisy baseline in this well. Measurable water-level recovery of 0.1 foot was observed in the deep well at MW-54 (MW-54-195). Water-level recovery in the other Arizona wells was below the estimated detection limits.*"

It seems arbitrary to select 0.1 ft as a detection limit, and then decide that a variation of only 0.05 ft at MW-55 implies a hydraulically connection across the river. The potential error in the adopted deconvolution method could be substantial, especially given the combination of complicating factors which include barometric effects, solid earth tides, river fluctuation, and density/temperature variations. A review of the actual deconvolutions and comparison of simulated vs. observed drawdown for MW-54-195 (see **Figure 19**, below) does not convincingly demonstrate any hydraulic connection (as the May 2008 test showed), or that the model is able to capture the response. It is unclear why the variation in river stage over the test was not included in the modeling as this drives much of the transient fluctuation in all wells evaluated. The river fluctuation could have been left out of the deconvolution analysis to directly compare results. Also, it seems like the relatively high water density variations in formations beneath the River would also need to be considered in the modeling, as drawdown changes would likely dampen out beneath the River due to upconing (buoyancy effects).

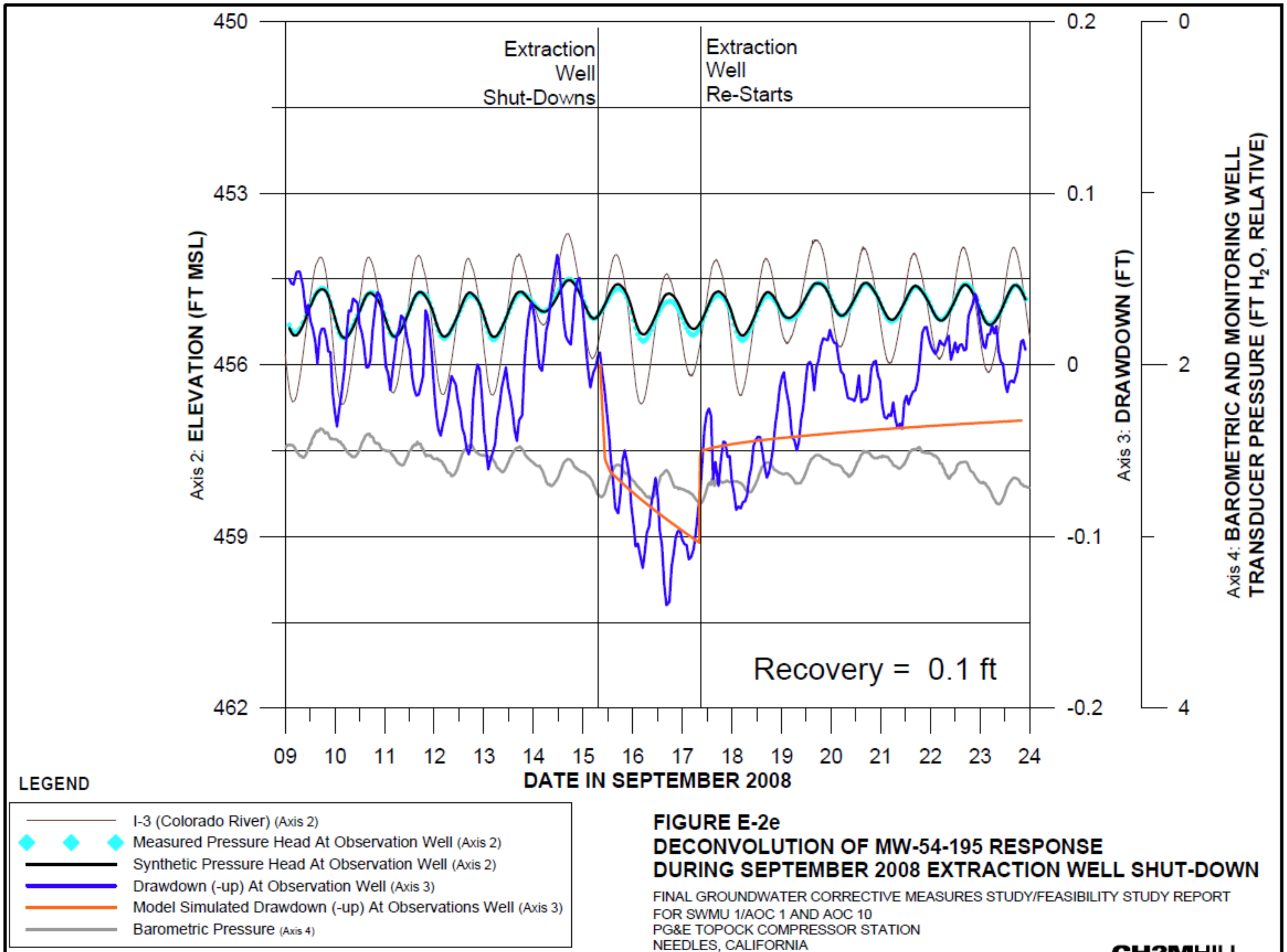


Figure 19. Reproduction of Figure E-2e from CH2M Hill (2009).

The application of the USGS Halford method (Halford, 2006) used here did not indicate that the effects of solid earth tides were incorporated in the plotted data. Earth tides can easily vary up to 0.1 ft, which is similar to the variations recorded at MW-54 and MW-55. In addition, the use of two different plotting axes does not show the errors introduced in matching synthetic and measured well response (before the shutdown), which also appear to be easily within the 0.1 ft perturbation. Figure 21, below, shows that the magnitude of "drawdown" shown by the blue line (calculated by subtracting synthetic pressure from measured pressure) during the pre-shutdown period (i.e., September 9 through 15) is as great (~0.1) as during the shutdown (September 15-17), or even after it, probably because the synthetic pressure did not capture all influences, or incorporate all measurement errors (i.e., like solid earth tides, diffuse areal recharge fluctuations; in addition to barometric and river fluctuations, were not incorporated). In other words, the water level variations in MW-54 and MW-55 recorded during the shutdown period are indistinguishable from the variability observed before and after the shutdown period, which suggests these wells did not respond to the shut-down.

Simulated transient well responses to river fluctuations ((Appendix E in CH2MHill, 2009, see Figures E-1a through E-1p) appear to reproduce observed monthly responses in the selected California wells over a 2 to 3 year period. However, no such comparison was made to Arizona wells MW-54 and MW-55 (or MW-56) at different levels. It is unclear why this is the case, but this fact precludes any evaluation of model performance (i.e., calibrated) in this local area within Arizona. Why install monitoring wells MW-X and MW-Y if the existing monitoring wells MW-54 to MW-56 have not been used to calibrate the model?

More convincing evidence must be presented to all stakeholders before concluding that Arizona groundwater will be affected by California activities. Before concluding a hydraulic connection could exist under the operational conditions of the proposed remediation system operation and requiring additional undesired monitoring wells, a more rigorous testing program is needed. Options include imposing a much greater stress on the system (i.e., an aquifer pumping test) to propagate drawdown from the California side than that induced by the shutdown at PE-1 and TW-03D for just two days. A longer pump test would register a much clearer and unambiguous response in existing Arizona wells MW-54, MW-55 and MW-56. Also, a tracer test could be used to evaluate if an actual connection is present. Ultimately, the model, despite its clear deficiencies, should have been used in conjunction with fully transient river and Topock Marsh fluctuations, to evaluate the potential impacts of the shutdown on Arizona wells rather than attempting a deconvolution. The model has the benefit of including other important factors that influence drawdown propagation (i.e., associated rise due to shutdown of PE-1 and TW-03D) such as the variation in assumed hydraulic conductivity, riverbed conductance and variation in bedrock surface and layer thicknesses.

May 2008 IM-3 Extraction Well Shutdown shows no response in Arizona

From the CH2M Hill (2008; see **Figure 20**) 54-well construction/testing study, it is learned that:

> "*Hydraulic response attributable to the shutdown of groundwater extraction in wells PE-01 and TW-03D was observed in wells up to 1,600 feet away from the nearest extraction well. The*

hydraulic response attributable to the shutdown of injection well IW-3 was observed in wells up to approximately 1,300 feet away. ***Hydraulic response if present, is too low to quantify on the Arizona side of the river. For the MW-54 and MW-55 monitoring well clusters, the lack of quantifiable response is likely due to multiple complex and poorly understood overlapping processes, the largest of which is the Colorado River stage fluctuations. "*** [Emphasis added.]

Calibration Results are Questionable

Four target datasets were used (CH2MHill, 2005) for calibration of the groundwater flow model:

a. Recovery in transducer-equipped monitoring wells following shutdown of TW-2D in November 2004
b. Average monthly groundwater elevations in transducer-equipped monitoring wells (available data between 2003 and March 2005)
c. Recovery in Observation Wells during injection well testing at IW-2 and IW-3 in January 2005
d. Estimated velocity and flow orientation of chromium plume development between initial discharge in 1951 to detection at MW-20 in 1999.

Results of the model calibration in the vicinity of the River and in Arizona are questionable for several reasons:

1. Neither the flow, nor the fate/transport model were calibrated to years of carefully monitored water level and concentration data (i.e., Quarterly IM-3 Monitoring reports) associated with operation of the IM-3, following the 2005 calibration period. The accuracy and reliability of model predictions are critical for demonstrating the model performance not only in the vicinity of IM-3, but also near MW-X and MW-Y.

2. Standard calibration statistics (Anderson and Woessner, 1994) were never presented (i.e., Root-Mean-Square Error, or RMSE, values by layer, or spatial distributions to show bias) for the calibration to average monthly groundwater elevations (b above), or in any of the modeling-related documents reviewed for the Topock groundwater remediation project. Though the model seems to reproduce qualitatively reasonable monthly fluctuations at many wells, some don't compare well and ultimately, there is no way to determine whether calibration is actually adequate for the intended purposes, and how calibration errors may influence key model predictions (i.e., flow rates, well spacings, etc.). Comparison of simulated and observed well water levels reveals that many of the wells show deviations approaching or exceeding 1.0 ft (**Figure 21**). This error greatly exceeds the 0.1 ft simulated difference observed in the September 2008 shut-down test response at MW-54-195. The May 2008 shutdown test response actually showed no response, but was disregarded due to unexplained 'anomalous' river readings (CH2MHill, 2009). Finally, though response is reported for wells in 3 different depth zones, assessment of model performance in terms of vertical gradients,

or even flow directions (i.e., flow up or down) is never presented. It is unclear whether the model predicts the correct vertical flow direction, especially near the river and in Arizona.

3. Neither the groundwater flow model, nor fate/transport model were calibrated against key remedial performance metrics such as hydraulic gradients/flow directions and concentration trends. Yet these model predictions will be used to make critical decisions on whether the system is performing as expected, and if not how to modify design or operations (see Tables 2.1-4, 2.1-5 and Figures 2.2-2 through 2.2-9 in the 90%BOD O&M Volume 2 report – see CH2MHill, 2014c).

4. The model was apparently calibrated to historical plume movement (i.e., target d above), but even a qualitative calibration performance assessment was never presented in the CH2MHill, 2005 report. This should have been provided to gain perspective on the model's performance near the river, and beneath it in Arizona near MW-X and MW-Y.

5. Calibration to response to shutdown of extraction well TW-2D, and injection wells IW-2 and IW-3 only provides a very localized sense of performance assessment near these particular wells. In addition, the implication of the calibration to these events or relevance to eventual remedial system performance metrics is never discussed. This would be especially important when considering the need or locations for proposed monitoring wells MW-X and MW-Y. Results at some wells showed notable deviations from actual observed conditions.

6. Simulated groundwater levels shown on **Figure 21** stop abruptly at the river, and therefore offer no insight into the model performance (or accuracy) in Arizona, especially in at wells MW-54, MW-55 and MW-56 installed in 2008. Though the model was calibrated in 2005, no attempts appear to have been made to update this to well response in these three Arizona monitoring wells. At a minimum, this should be done to improve the reliability of the model before attempting to predict future remedy bypass into Arizona, requiring wells at locations MW-X and MW-Y.

No Results Provided for Model Update after 60% BOD

Page xii of the 90% BOD Report (CH2M Hill, 2014a) states:

> "*Additional modeling efforts completed since the 60% design include an update of the regional groundwater flow model ("the regional flow model") and groundwater flow submodel to reflect hydrogeology encountered at Site B in the vicinity of HNWR-1*".

Details describing all assumptions, calibration, and long-term response with all possible stresses do not appear to have been presented anywhere. So it is impossible to assess the performance of the model in Arizona.

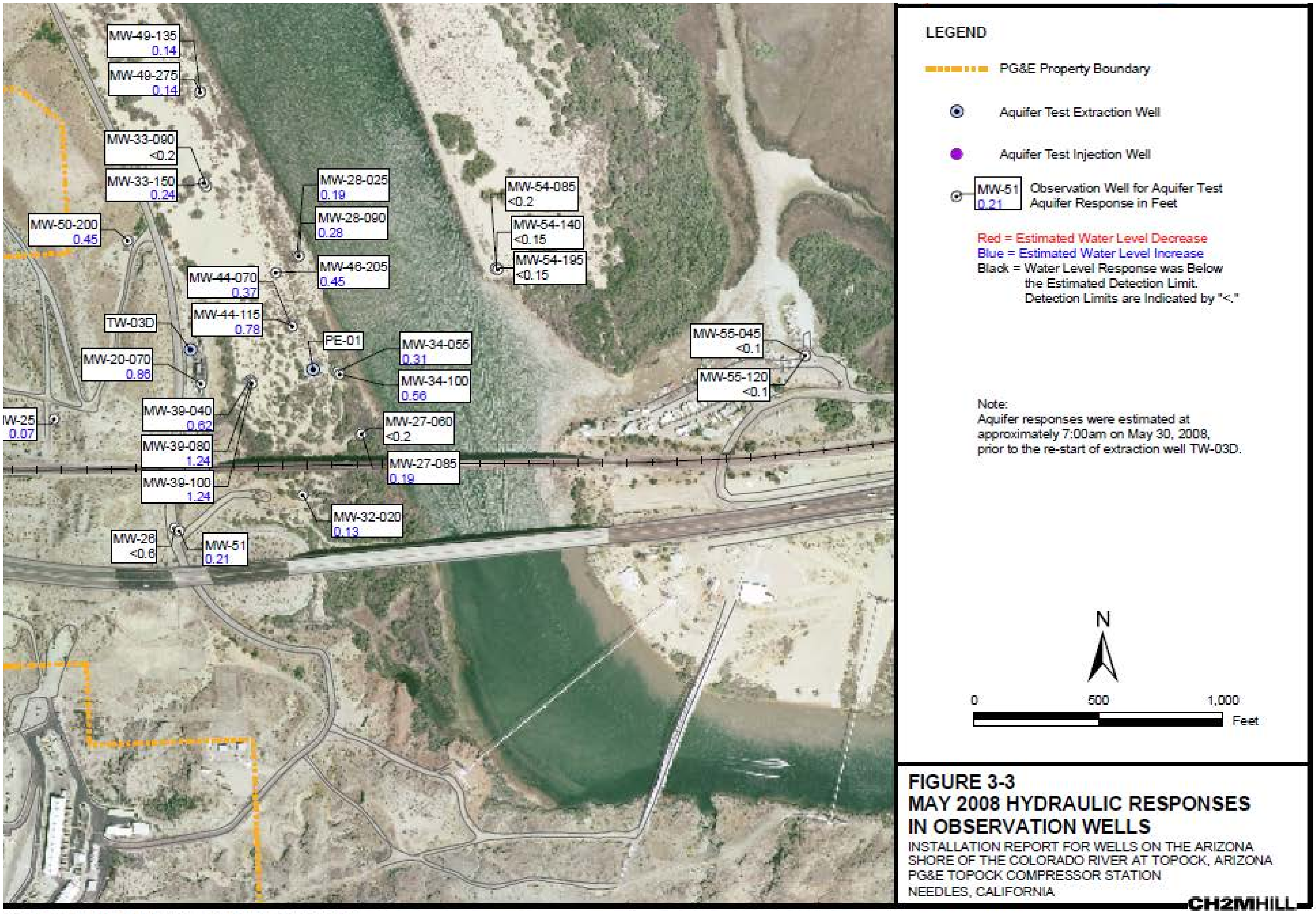


Figure 20. Documentation (CH2MHill, 2008) that MW-54 and MW-55 displayed no hydraulic response to the shutdown of IM-3 extraction wells PE-1 and TW-03D in 2008.

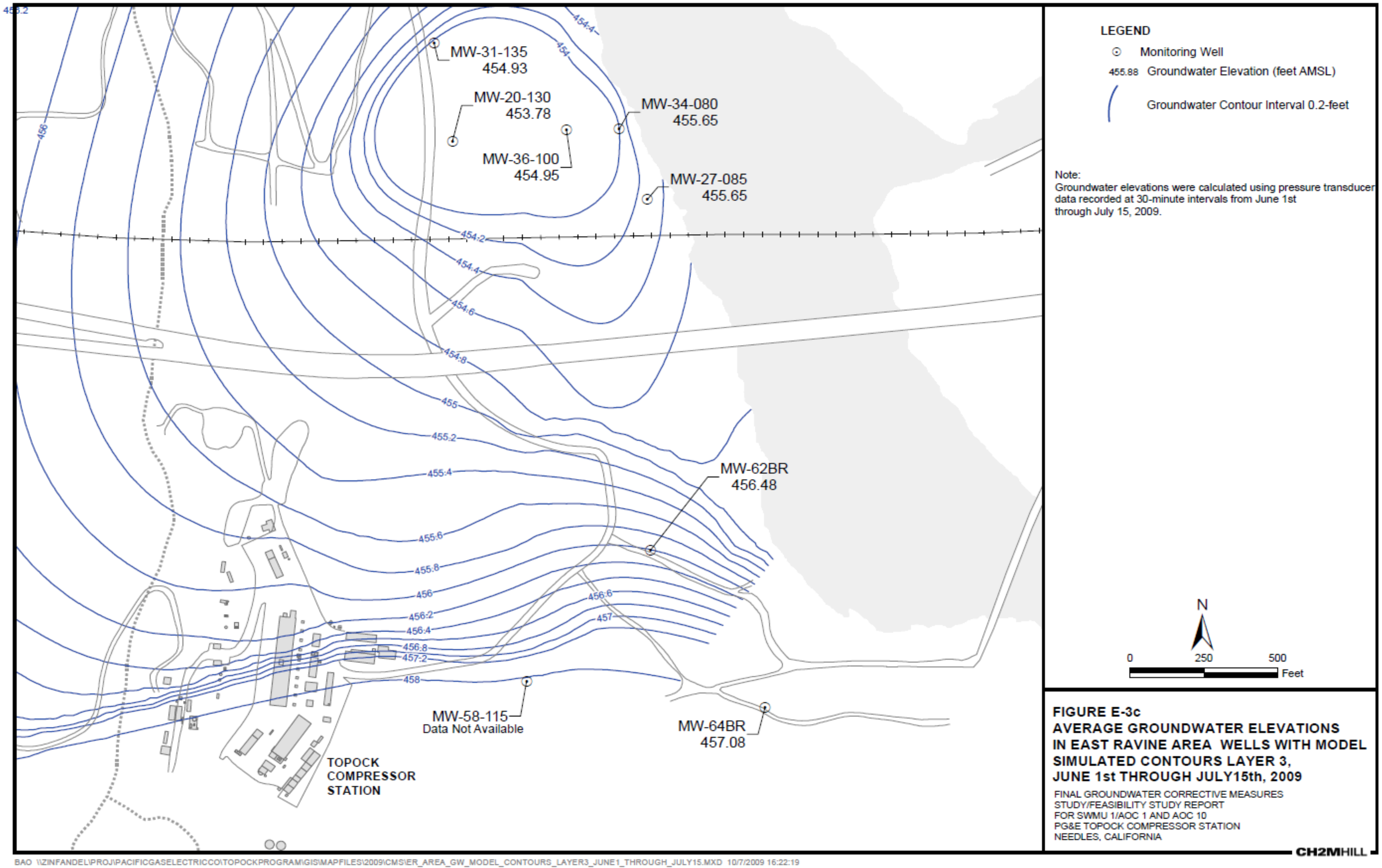


Figure 21. Simulated contours compared to observed, time-averaged (pressure transducer) groundwater levels for model layer 3 (CH2MHill, 2009).

Simulated Results of Site B Extraction Questionable/Uncertain

Exhibit 3.3-3 on page 3-39 (CH2MHill, 2014a), reproduced below as **Figure 22**, shows a concentric ring around HNWR-1/HNWR-1A, representing a simulated 5-year cone of influence (based on AZ guideline fixed-radius equation referenced in CH2MHill, 2014a). If the regional microFEM model was updated with hydrogeologic data from Site B, a perfect concentric cone of influence would not develop like this. Instead, a non-circular drawdown cone would develop as a function of variable aquifer thickness, overlapping drawdowns from other wells in the area, complex, dynamic seasonal interaction with surface waters (Topock Marsh, Colorado River), and complex ET and heterogeneous distribution of hydraulic properties within the aquifer. In any case, details of the subsurface such as the bedrock surface configuration beneath Site B and how it changes up into Sacramento Wash, and changes in hydraulic properties by depth, etc. should be addressed at this point at least on a conceptual level. This would allow a better understanding of how dewatering from Site B and HNWR-1A might influence and complicate flow paths beneath the River during full remedial system operation.

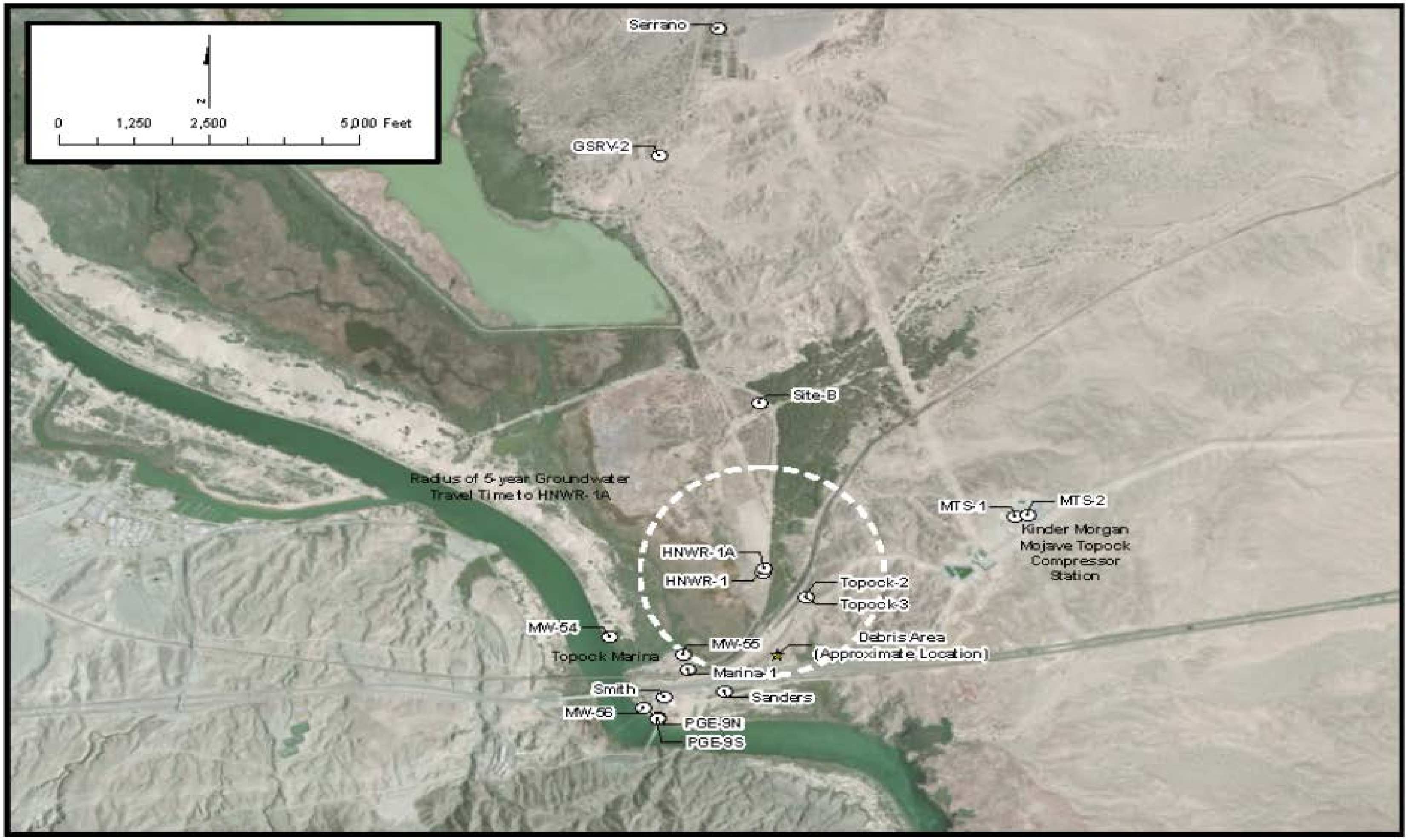


EXHIBIT 3.3-3
RADIUS OF FIVE-YEAR GROUNDWATER TRAVEL TIME TO HNWR-1A WELL
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Figure 22. Calculated radius of influence of freshwater supply well HNWR-1A at 5-years based on Arizona fixed-radius equation (page 3-37, CH2M Hill, 2014a). This should be calculated for life of remedial system (i.e., 30 years or more) and using an updated regional MicroFEM model.

Figure 6.5-17 in 90% BOD App B Groundwater Modeling report (CH2MHill, 2014a), reproduced earlier in this paper as **Figure 3** above, indicates some potential for flow breakthrough to the proposed MW-X and MW-Y location(s) during IRZ operation. However, two considerations are worth noting:

a. Monitoring wells between River Bank Extraction Wells (MW-29, MW-49, MW-33, etc.) would show concentration exceedances and violate hydraulic gradients for capture long before any impact would be seen at proposed MW-X or MW-Y. These wells are intended to monitor for bypass of the IRZ treatment area before concentrations were to enter the river or worse, move into Arizona. Monitoring wells located between extraction wells are roughly in the center of each river bank extraction well, where the potential for migration past the capture zone barrier created by the river bank extraction wells would be greatest. So these well locations would be the best locations to monitor for a breakthrough. River bank extraction wells are the least likely breakthrough points as they act as groundwater sinks.

b. In addition, simulated gradients, heads and particle paths are highly uncertain in this area and especially beneath the river. Until the multiyear IM-3 system is simulated and compared against flow and transport response data, model predictions beyond the western river bank should not be relied upon.

From review of the 90% BOD report (CH2M Hill, 2014a) the following were noted:

- For the 90%BOD review, no documentation was provided to the Tribes on the updates to the regional flow model (microFEM presumably performed by CH2M Hill which incorporated additional data from Site B drilling).
- No documentation was provided to the Tribes describing what specific changes were made to the 60% BOD sub-model (MODFLOW and MT3D) in going from 60% to 90%, nor were updated model input files provided for review as was done for the 60% BOD review.
- These updates and all inputs and assumptions are important to Tribes for assessing the performance and reliability of the constructed models and their predictions.
- It does not appear that water extraction from HNWR-1A or the Site B well extraction plus time-varying stage in the Colorado River and Topock Marsh area were ever simulated to better assess probable changes in flow paths.

Recommendations

Several actions could be undertaken immediately to improve understanding of groundwater flow beneath the River and on the Arizona side without incurring considerable cost or schedule delays. The ongoing unrelated project delay due to Subsequent Environmental Impact Report (SEIR) development, combined with the time needed for construction of the system, and system startup/testing should offer sufficient time for PG&E to address some of the limitations noted above. This should provide much needed justification to all parties, especially the Tribes, that any new monitoring wells in addition to MW-54, MW-55 and MW-56 are in fact needed, and that proposed numbers, locations, depths and sampling frequencies have a sound basis.

Field Testing/Monitoring

1. **Tracer Test.** Conduct a tracer test immediately to determine the nature of any hydraulic connection between existing Arizona monitoring wells and California IM-3 extraction and/or monitoring wells:
    a. Introduce different tracers into the deep zones of wells MW-54, MW-55 and MW-56. Based on the current understanding, this is the only likely pathway beneath the Colorado River.
    b. Monitor individual tracer breakthroughs at various depth zones in monitoring wells between PE-1 and TW-3D and Arizona wells (i.e., at MW-34 near PE-1, or at MW-54, if injecting at MW-55).
    c. Utilize the current MODFLOW model with transient river fluctuations, or ideally an updated model, to help predict breakthrough times for each tracer. Even if the time it takes for a tracer to migrate from any of these wells to the west side takes more than a year (i.e., 1 to 2 years based on current gradients and assumption that a flow path exists and does not stop at a potential hydraulic river barrier at depth), even extending into startup of the proposed remedial system (i.e., NTH IRZ injection/extraction wells, Riverbank wells, etc.), the information gained by any tracer test (i.e., just showing hydraulic connection) would be highly valuable in revising the CSM, and model flow and fate/transport parameters. These updated parameters could then be used to assess the number, locations, and depths of any additional monitoring wells beyond MW-54, MW-55 and MW-56.

2. **Monitoring Data.** Monitor head, temperature and conductivity continuously (i.e., hourly) using dataloggers/transducers at all AZ wells (at least MW-54, MW-55, and MW-56).

3. **Revised Contour Maps.** Prepare groundwater contour maps across the entire area bounded by continuous monitoring wells in both Arizona and California for specific times (at a certain hour in a day) using the continuously monitored (hourly) data, incorporating River and Topock Marsh surface water fluctuations in appropriate layers (similar to DOI comments #104 and #105).

Model Revision and Re-Evaluation of Monitoring Need/Locations

1. **Conceptual Model Update.** Develop and clearly describe a conceptual flow/fate/transport model that describes 3-dimensional (horizontal and vertical) flow conditions, based on available data and characterizations, in the vicinity of the River , beneath the River, and into Topock Gorge, and within Arizona to all areas that have stresses (i.e., pumping) that may affect groundwater flows within the eastern banks of the River, or which might be influenced by the remedial system, including the freshwater sources.

2. **Use Current Industry-Standard Modeling Tools.** If PG&E is committed to continuing to using MODFLOW/MT3D, at least consider using more up to date standard MODFLOW packages which would simulate ET, Recharge and River-Aquifer exchange processes more realistically:
   a. ET boundary condition – Instead of using the original MODFLOW EVT package which treats ET loss as a linear function of hydraulic head (not very physically realistic), consider using MODFLOW Riparian ET package (available for MODFLOW-2005) http://pubs.usgs.gov/tm/tm6a39/pdf/tm6a39.pdf, or even the ETS package (http://pubs.er.usgs.gov/publication/ofr00466).
   b. Recharge boundary condition – See the following publication on the Basin Characterization Method (BCM) currently used by the USGS in a number of southwestern basins. (http://pubs.usgs.gov/pp/pp1703/b/pp1703b.pdf) or (http://pubs.usgs.gov/sir/2007/5099/).
   c. River boundary condition – Consider using alternative, newer and more robust stream-aquifer packages to simulate the interaction between the Colorado River and the underlying aquifer(s):
      i. STR package (older than the subsequent two SFR packages, but more robust than RIV package used in the Topock MODFLOW modeling (http://water.usgs.gov/nrp/gwsoftware/modflow2000/MFDOC/index.html?riv.htm)
      ii. SFR1 package - http://pubs.er.usgs.gov/publication/ofr20041042
      iii. SFR2 package - http://pubs.usgs.gov/tm/2006/tm6A13/
   d. Consider simulating flow conditions using a density-dependent flow code (i.e., FEFLOW, SEAWAT (MODFLOW/MT3DMS-based) , SUTRA/Sutrasuite, or even MODFLOW-SURFACT) so that the effects of density and temperature variations could be considered in the modeling as they affect current and future remediation-affected flow paths.

3. **Revise Model Layers.** Revise model layers to coincide with hydrostratigraphic units (and screened zones where possible), and consider adding more layers (i.e., subdividing single units) so that surface water interaction with groundwater, and flows and fate/transport can be simulated more realistically. Not doing so can produce misleading fate/transport estimates (i.e., concentration trends, pathways, etc.).

4. **Recalibrate the Model.** Re-calibrate the existing flow and fate/transport models to the many years of readily available IM-3 quarterly monitoring response data, including fully transient river and Topock Marsh stage fluctuations. Use information from tracer testing in existing Arizona wells (MW-54, MW-55 and MW-56) as described in recommendation #1, continuously monitored and correctly salinity-adjusted Arizona well water levels, and revised conceptualization to assess more realistic/consistent 3-D flow paths beneath the river and into it.

   Reassess and revise all model parameters during calibration, especially parameterization of hydraulic conductivity, storage and riverbed conductance beneath and east of river. These distributions are far too complex due to poorly constrained parameter estimation in this area using PEST. Also reassess and revise ET parameters, recharge and river cells, as detailed above.

   i. Show 3-dimensional particle flow paths, if any are found to exist beneath the river, and in California.
   ii. Utilize PEST where possible, but better constrain the distributions such that critical parameter distributions such as hydraulic conductivity or riverbed conductance don't abruptly change in physically unrealistic/unjustified ways beneath critical parts of the river (i.e., between MW-34 and MW-54 and MW-55.)
   iii. Provide calibration statistics in a more standard and transparent way so all stakeholders can gain confidence in future predictions in key areas of interest, especially in the MW-X and MW-Y proposed area.

5. **Validate the Model.** As an alternative to re-calibrating the model to IM-3 data above, consultants could demonstrate acceptable performance of the model by validating it to IM-3 data as per modeling guidelines outlined on page 12 of this California DTSC document (https://www.dtsc.ca.gov/PublicationsForms/upload/GW_Modeling_for_Hydrogeo_Characterization.pdf).

6. **Conduct Simulations to Predict Future Flow Conditions.** Estimate all future flow paths and fate/transport for the current proposed remedial system with **transient conditions** instead of the steady state approach used in 90% BOD. This should include site conditions such as IRZ on and off, variable stage for the Colorado River and HNWR Topock Marsh, and influence of HNWR-1 (+/- Site B) well extraction, with/without the west side river bank extraction wells operating. Using a transient model that includes the time it takes for the California-side groundwater levels to adjust to IRZ wells being turned off or on with overlapping seasonal and daily fluctuations of the river will greatly aid future tribal (and all stakeholder) visualization and interpretation of the potential for predicted groundwater flow paths in the vicinity of the river, beneath it and into Arizona. This should also greatly aid in evaluating whether monitoring wells MW-X and MW-Y are needed, and whether their locations are appropriate.

7. **Optimize Operations.**
   a. Consider using a standard optimization approach (Optix w/Feflow, or HGL's PBMO software that works with MODFLOW/MT3D (http://www.hgl.com/expertise/modeling-and-

optimization/software-tools/pbmo-toolkit/)) to optimize proposed remedial system decision variables (pumping rates, TOC injections, cycles, pumping depths, injection/extraction well locations, etc.) given various implicit/explicit optimization constraints (i.e., minimizing remedial time, minimizing spatial extent of plume, minimizing by-products) with a new constraint that limits impacts of Arizona water by California remediation operations (i.e., extraction at River Bank wells). Additional constraints could also be considered – going forward w/O&M – which include minimizing pumping rates, TOC injection rates, cycling periods etc.

b. Consider Federal Remediation Technologies Roundtable Remediation Optimization approaches: http://www.frtr.gov/optimization/default.htm or USGS GWM-2000 approaches: http://water.usgs.gov/nrp/gwsoftware/mf2k-gwm/MF2K-GWM.html; see also: http://pubs.usgs.gov/fs/2005/3095/ .

c. Using the revised model, determine whether any additional monitoring wells are actually needed AND if actually needed, then optimize their number/placement – for all proposed remedial system designs/operations and any changes in the proposed system (including HNWR-1A, Site B, River Stage, or any other nearby pumping stresses). The model is the only tool available that can account for all known complexities/conceptual flow conditions, as long as all variables are addressed within the model. Assess 3-D, time-varying (seasonal) pathways between the west and east sides of the Colorado River, if any exist, given annual variations in pumping (west and east sides) AND seasonal variations in river and HNWR Topock Marsh stages.

Define an Alternative Basis for Performance Assessment of the Proposed Remedy

1. **Define a more appropriate target hydraulic containment boundary.** The 90% BOD report (CH2MHill, 2014a) does not mention “hydraulic boundary” or “hydraulic containment” area similar to what is done at the Hinkley Site. To meet RAO objectives (i.e., RAOs #2 and #4 (CH2M Hill, 2014a)), the target hydraulic containment boundary should be either:
    i. The eastern boundary of the Cr(VI) plume, which varies with depth. This boundary is ideal as it prevents migration of the plume into clean areas to the east. This may require additional refinement of the proposed NTH IRZ injection/extraction and Riverbank well extraction strategy, but it can likely be done.
    ii. The western bank of the River, or center line of the river as this technically represents the primary hydraulic boundary between west and east groundwater flows (and it represents the state boundary).

2. Define well pairs/triplets on the western side of the river to monitor gradients and concentration trends such that Cr(VI) does not move east of the current western plume boundary at any depth, or does not move to the edge of the western river bank, except in the vicinity of MW-34, where the plume has migrated furthest to the east at depth. In this area, wells MW-54, MW-55 and MW-56 more than adequately provide eastern monitoring points for assessment of eastward migration.

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TECHNICAL MEMORANDUM

PG&E Response to MW-X and MW-Y Whitepaper

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DATE:	August 14, 2015
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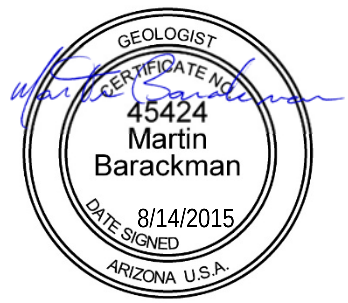

Expires 12/31/2015

As an action item from the July 23, 2015 Technical Work Group Meeting, this memorandum was prepared to present PG&E's review of a whitepaper, titled *Evaluation of Technical Justification for Proposed Monitoring Wells MW-X and MW-Y*, prepared by Robert Prucha and Margaret Eggers, dated July 15, 2015. The whitepaper addresses several technical aspects of the Topock conceptual site model and associated groundwater models as they relate to the location and purpose of the proposed monitoring wells MW-X and MW-Y in Arizona. PG&E's review is organized in the same general order as the whitepaper:

- Principal Premise – Purpose of MW-X and MW-Y
- Alternative Downgradient Monitoring Locations
- Use and Interpretation of Available Groundwater Level Data
- Groundwater Model Setup and Calibration
- Whitepaper Recommendations

Principal Premise -- Purpose of MW-X and MW-Y

The white paper states:

> "*The focus of this review was to evaluate the technical rationale applied to the siting of proposed monitor wells MW-X and MW-Y including the use of the existing groundwater model and other data. In particular, the potential for hydraulic communication beneath the Colorado River between the CA and AZ was evaluated. This necessitated a thorough examination of the assumptions applied in deciding on the need for these wells within the performance monitoring network. The Department of Toxic Substances Control (DTSC) has relied heavily on the groundwater model as the basis for the design and operation of the proposed remedial system (CH2M Hill, 2014a). As such, DTSC has also relied exclusively on the model in its current state to conclude that monitoring wells are needed across the river, at the proposed MW–X and MW–Y locations in Arizona.*"
>
> "*Currently, the purpose for MW-X and MW-Y appears unclear and raises additional questions.*"

As to the purpose for MW-X and MW-Y, the following is stated in DTSC's July 2014 presentation (titled "Proposed New Monitoring Wells for 90% Design" dated June 18, 2014) to the TWG:

> "*7. Arizona Sentinel Wells: At least two wells to monitor hydraulic capture and confirm that plume does not expand over the life of the remedy.*"

The importance of capture zone monitoring is supported by the agencies' direction letter on the remaining 60% design issues dated April 4, 2014:

> "*It is imperative that appropriate and acceptable plume control for both contaminants and byproducts be evaluated and established for the remedy. Furthermore, capture zone monitoring must provide definitive criteria and sufficient data that would allow DTSC to meet the plume control determination as specified in Exhibit A5a of the DTSC 2012 settlement with FMIT and to enable DTSC to reach findings required under Exhibit A1 and A2 for decommissioning of IM-3.*"

In addition, DTSC noted in its response to 90% comment #17 that these wells (i.e., MW-X and MW-Y) need to be installed early to establish baseline concentrations for water quality constituents (e.g., baseline chromium concentrations) so any naturally occurring trends can be observed before remedy start up. This will assist in determining if the well has been affected by the remedy.

Therefore, PG&E understands the need for MW-X and MW-Y to be as follows:

- Provide monitoring of chromium and byproducts downgradient from the treatment zone (i.e. sentinel wells).
- Provide groundwater levels for evaluating hydraulic influence of river bank wells and better defining capture zone.
- Provide baseline characterization of the aquifer in an area that is currently poorly characterized but important to the remedy and the model.

More importantly, PG&E also understands that the need for downgradient/sentinel wells such as MW-X and MW-Y is not driven by model results, and would not be negated by a model.

The following sections provide PG&E's response to the whitepaper, with the topics in the same general order as they were originally presented.

Alternative Downgradient Monitoring Locations

The whitepaper proposes that the river bank extraction wells could be moved inland so that hydraulic capture could be achieved around the margin of the chromium plume and downgradient monitoring could be implemented on the California floodplain. Moving the pumping wells closer to the IRZ increases the velocity through the sections of the IRZ closest to each river bank extraction well. With uneven flow velocity across the IRZ, there is a risk of chromium breakthrough in the higher velocity sections. To prevent breakthrough more carbon would have to be added, which could result in excess carbon and excess byproduct generation in the lower velocity sections of the IRZ. More organic carbon and in-situ byproducts would reach the extraction wells, leading to increased well maintenance on both extraction and injection wells. The separation between the IRZ and the river bank extraction wells in the current design is the minimum needed to avoid negative impacts of the wells on the IRZ and vice-versa. Moving the extraction wells inland of the plume boundary would require relocating the IRZ a similar distance further inland, into the upland area. A significant portion of the plume containing relatively high concentrations of chromium would then be located downgradient from the IRZ, presumably to be captured by the relocated river bank extraction wells. A treatment plant could be needed to remove chromium from the water pumped by the extraction wells prior to its re-injection in the IRL wells. Thus, establishing hydraulic capture in the floodplain with the river bank extraction wells relocated inland would result in a major re-design of the remedy, additional impacts in the uplands, and potentially expanded treatment system infrastructure and footprint. This could be considered a different remedial approach than approved by the DOI (Groundwater ROD, Dec. 2010) and DTSC (Resolution Approving the Final Remedy Project, Jan. 2011), could potentially take the project back to the CMS/FS stage.

Use and Interpretation of Available Groundwater Level Data

General Groundwater Flow Patterns near Topock

Based on the discussion and figures provided, it appears there may be a misconception in the whitepaper about groundwater flow patterns near the site. In order to be sure that there is common understanding, PG&E would like to provide some clarification of the conceptual model of groundwater flow at the southern end of the Mohave Valley. Figure 9 in the whitepaper is a groundwater contour plot showing groundwater flow from Arizona converging at the river channel and exiting southward through the narrow "notch" where the river flows between two bedrock outcrops. Only a small fraction (<10%) of the groundwater leaving the Mohave Valley flows through the notch where the river exits the valley. The majority (>90%) flows through a much deeper and wider paleo-channel beneath the Topock Marina. The existence of this paleo-channel and its inclusion in the model was directed by the USGS (Peter Martin, Program Chief of the Desert and Eastern Sierra Nevada of the California District) and is supported by geomorphology work done by Dr. Keith Howard of the USGS, which included carbon dating of sediments from boreholes on the Topock floodplain that showed the age of the fluvial material beneath the current river channel to be less than 12,000 years.

Although there are currently local gradients defined by MW-54 and MW-55 that show westerly flow, these westerly gradients are likely in large part a response to IM-3 pumping. The overall groundwater flow pattern under non-pumping conditions likely has an easterly component, from the Topock floodplain toward Arizona where most of the groundwater flows out of the valley. During the final remedy, the pumping of freshwater from Arizona will strengthen the natural easterly component of the gradient, resulting in increased potential for easterly migration of groundwater from California if the capture zone of the river bank extraction wells is incomplete. This easterly component would be most prevalent in the northern portion of the floodplain, where MW X and Y are proposed.

The groundwater contours in Figure 9 of the whitepaper are not consistent with the overall conceptual model of the site and are not representative of what would be expected during the operation of the final remedy. PG&E is concerned that much of the discussion about location of MW's X/Y and the hydraulic connection between Arizona and California in the whitepaper may be affected by what appears to be a basic misunderstanding of the groundwater flow patterns in the southern portion of the Mohave Valley.

Use of Water Level Data from Arizona Wells in Model

In response to questions raised in the whitepaper, PG&E can confirm that continuous water level data has been collected from the vertical well clusters in Arizona, MW-54 and MW-55 since 2008. These wells were not installed until late 2007, so the data from them were not available in during original calibration of the groundwater flow model in 2005. Although they were not incorporated in the original model calibration, the depth to bedrock in the model was subsequently revised to account for the observed bedrock contacts in the MW-54 and MW-55 boreholes and the depth to bedrock estimations from the USGS seismic survey conducted in the river channel at about the same time. The revised model projections were compared with measured water levels in the MW-54 and MW-55 wells and the match was determined to be reasonable. Therefore, no model recalibration was considered necessary based on data from these wells. As noted in the whitepaper, no long-term pumping tests have been conducted in the vicinity of MW-54 and MW-55 and the influence from IM-3 pumping at these locations is too slight to provide reliable measurements above the river fluctuations. Continuous water level data are available from these wells starting in 2008 and the average water levels from them are presented in the PMP reports.

As noted in the whitepaper, continuous water level data are not collected from the slant wells, MW-55 and MW-56. Slant wells were originally proposed as individual wells, each in a separate borehole. This would have required 6 boreholes at each slant well location. In order to minimize the number of boreholes, PG&E developed a design that allowed three monitoring intervals in each slant well borehole. Conventional well construction techniques could not be used due to the instability of the boreholes and the extreme angle at which they drilled. Consequently, the screened intervals in these wells consist of small diameter porous tubes (similar to Barcad® samplers) connected to small diameter (3/8") flexible tubing. The upper portion of the wells is 1" PVC pipe, which can accommodate a small transducer but is too narrow allow insertion of a sounder in the well while the transducer is installed. Manual water level readings using a sounder are needed to calibrate a transducer in order to obtain a precise water level elevation. Even if sounders could be inserted, precise measurements of the angle of the pipes would be needed to establish the vertical depth to water. In addition, precise knowledge of the vertical depth of the monitoring interval would be needed to calculate a salinity correction and allow the water level to be referenced to mean sea level datum. The angle of the boreholes and depth of the monitoring intervals is not known with sufficient precision to allow these wells to be usable as water level monitoring points. The inability to get accurate water level data from these wells was anticipated and discussed at the time they were installed. It was understood that this was a trade-off the project stakeholders were willing to make in exchange for obtaining sufficient water quality data while minimizing the number of boreholes.

Water Level Averaging to Evaluate Gradients

The whitepaper contends that averaging of water levels from the transducers is not an appropriate way to measure average gradients. We believe this is incorrect. This issue was debated at length among all the stakeholders in late 2004 and early 2005 when the gradient metrics for IM-3 were being established. Particle tracking was conducted to show that groundwater movement in the floodplain could be predicted equally well with monthly average gradients or daily or hourly gradients. This method of monthly averaging of water levels has proven to be reliable over a decade of monitoring at this site. Water levels all across the site fluctuate in response to changes in river elevation, so a snapshot of water levels at one time of day may show flow toward the river while at a different time of day it would be away from the river. A groundwater divide is seen in snapshot water level plots that moves back and forth through the day. Without averaging, there is no way to make meaningful conclusions about overall groundwater flow patterns at a site where water levels are fluctuating several feet per day.

Model Setup and Calibration

The whitepaper raises numerous issues about the setup and calibration of the models. The information in this section is intended to provide clarification and address some of these issues. The groundwater flow model was developed over more than a decade, with ongoing improvement at each stage. Many of the ideas raised in the whitepaper have been discussed before and some may be implemented in future updates of the model. Other issues are based on misconceptions that we will attempt to clear up.

Model Boundary Conditions

There appears to be a misunderstanding in the whitepaper about the linkage between the flow and transport models. The whitepaper seems to indicate that the edges of the transport model are no-flow boundaries. As described in Appendix B of all the basis of design reports (30%, 60% and 90%), all the boundaries around the edge of the transport model are prescribed flux boundaries. The boundary fluxes are exported from the flow model. The transfer of boundary flux from a larger model to smaller, more detailed model provides a linkage between the models so that the water balance from the larger regional model is preserved in the smaller transport model. The whitepaper suggests the transport model is deficient because the river cells are not specified along the section of the northern boundary coincident with the river. The river flux in and out of the cells along the northern boundary is incorporated in the boundary fluxes imported from the larger flow model. Specifying river cells at the boundary in addition to the specified flux already assigned there would introduce errors in the model. The river cells are assigned in the interior of the transport model, but not at the boundaries.

The stage in the river and marsh are set to annual average conditions and the flow model is run in steady state. This is considered appropriate for the purposes of evaluating a remedy that is designed to perform for decades. The short term daily and monthly river level fluctuations are not critical to understanding overall remedy performance.

Bathymetry in the river was established based on the USGS seismic survey data in the vicinity of the site and estimated elsewhere. Considering that the model is run in steady state and the water table is generally coupled to the river and the marsh, it is unlikely to be sensitive to the bathymetry. If the model was run in transient mode to simulate a low river level where a portion of the marsh were dry, then more accurate bathymetry would be needed.

Riverbed conductance has not been measured and could not be directly measured without wells installed into the river bottom. Conductance would have a much larger influence on the steady state model results than bathymetry. The conductance in the marsh was set to a lower value than the river in recognition of the muddy bottom typical in marsh environments compared to the sand bottom in the river channel.

Evapotranspiration (ET) is another parameter that is difficult to measure and therefore typically assigned based on literature values. The ET rate in the model is based on the fact that the vegetation is sparse, so that in any one model cell there are areas of bare ground and areas covered by plants. The ET rate in the model was developed through calibration to the areas of the site were groundwater level data were available, primarily in the California floodplain. As suggested in the whitepaper, literature suggests a higher ET rate could be appropriate, but when a higher rate was applied, the simulated water levels in the southern floodplain, where vegetation is most prevalent, were excessively low. Because neither river conductance nor ET are tightly constrained, it’s likely that a calibration could be achieved with a higher river conductance (to provide more water) and a higher ET rate (to extract more water). Because most of the phreatophytes are near the river, the net result of an increased ET rate on the groundwater flow across the site would likely be small. Because the river represents an essentially unlimited source of water to the model, the water removed by a higher ET rate would be provide by the river cells nearby. There would more water exchanged between the river and the vegetation but the effects of additional ET in areas away from the river would be muted.

Water Balance

The whitepaper questions the discrepancy in the water balance between a regional USGS model and the local scale Topock model. This discrepancy was noted at the time the Topock model was being calibrated. At that time the USGS model was unpublished, but the USGS was heavily involved in the

Topock project and provided a “preview” of the USGS model. PG&E attempted to apply the large volume of Sacramento Wash underflow that is suggested by the USGS model to the Topock model, but it resulted in water levels far above land surface all throughout the eastern side of the model. The inconsistency between the two models was noted but the reason for it was never resolved. At the time, USGS scientist Peter Martin agreed that the Sacramento Wash underflow in the Topock model was more reasonable than the value in the USGS model. He believed it was possible that there was another outlet from the Sacramento valley where groundwater could move south without flowing down the Sacramento Wash valley.

Model Layering and Depth to Bedrock

The model layers do not correspond to hyrostratigraphic units everywhere in the model. Shortly before the CMS was prepared, there was a considerable discussion about revising the layering in the model to make it more consistent with the geology and initial efforts were undertaken to accomplish this. It was recognized at the time that this change was largely cosmetic and would likely not make a meaningful difference in the model projections. Because it would have added significant time to the schedule, it was not completed and the layering in the model remains as it was in 2005.

The whitepaper questions the assignment of depth to bedrock in Arizona. Further information about the depth to bedrock in the Arizona portion of the model is provided in a tech memo titled “Additional Details on Aquifer Test Interpretation and Groundwater Flow Model Updates for the Arizona Portion of the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California”, distributed by e-mail from Christina Hong to the CWG members on August 12, 2015.

Density Dependent Flow

The issue of density dependent flow has been previously discussed in the Appendix B of the 90% BOD report, which states:

> *“With respect to TDS and density variations, while it is acknowledged that effects of density-driven flow may be possible, they are not expected to be significant. Given the aquifer heterogeneity and vertical anisotropy, and the relatively high expected flow velocities within the system in the vicinity to the freshwater injection wells, advection-driven flows are expected to allow adequate horizontal flows to develop and be maintained at all depths between freshwater injection wells and River Bank extraction wells. If however, effects of density are observed during remedy implementation (i.e. slower, or ‘short-circuiting’ of flushing within the deeper, more saline portions of the aquifer in areas some distance away from the injection wells with respect to monitored average hydraulic gradients), steps can be taken to mitigate these impacts.”*

Incorporating density dependent flow into the model would make it a very cumbersome tool for use in remedial design.

Aquifer Response to IM-3 Shut Down

The whitepaper seems to suggest that because the effects of shutting off the IM-3 were not clearly observed in wells in Arizona, there may be some kind of hydraulic barrier or at least poor hydraulic communication between California and Arizona. PG&E sees no geologic basis for this interpretation. A much more likely explanation is that the signal generated by the modest amount of IM-3 pumping is simply not strong enough to propagate to the wells in Arizona and be seen above the noise of the river fluctuations. It should be noted that even in the floodplain near the pumping wells, the amount of water level change observed from the IM-3 shutdown test was generally less than 6 inches. PG&E believes that there was a likely a small response observed in the Arizona wells, but it was just too small to be quantified against the noise of the daily river fluctuations. The lack of response from the IM-3 shutdown test does not suggest the lack of hydraulic communication.

Whitepaper Recommendations

PG&E responses to the recommendations in the whitepaper are presented in this section.

Tracer Test

The whitepaper recommends a tracer test to evaluate groundwater flow between existing Arizona monitoring wells at the MW-54 location and IM-3 extraction wells in California under the Colorado River. PG&E conducted a modeling analysis to gauge the duration and the scale of such a tracer test under current pumping conditions. Current pumping of IM-3 consists of PE-1 at 30 gpm and TW-3D at 100 gpm, and was simulated to continue for 5 years into the future. First, the groundwater flow model was utilized to conduct a pathline analysis where particles were initialized around the existing MW-54 monitoring wells to represent tracer injected into the middle and deep screened intervals of the well (Model Layers 3 and 4, respectively). The particles were then tracked for a 5 year period which represent the average groundwater flow movement, and while particles traveled farther in Model Layer 3 than Model Layer 4, after 5 years particles still did not reach extraction well PE-1 in California. After 5 years, the full remedial design, including groundwater extraction along the river bank, was simulated and the particles shifted their migration path towards RB-4.

The potential impact of pumping from a future Topock Marina groundwater supply well (not associated with the Topock Remediation Project) was also evaluated with the pathline analysis. The pumping rate at this hypothetical well was assigned as 16 gpm, based on the anticipated future water demand reported by the Topock 66 Resort. The hypothetical well was located at the same location as the current Topock Marina well (which pumps brackish water) and screened in model layers 3 and 4. It's meant to simulate a potential future well that could be drilled somewhere on the marina property and produce water of sufficient quality for use at the marina. The pathline analysis indicates that tracer particles also have the potential to eventually arrive at such a hypothetical future Topock Marina supply well.

To further evaluate the tracer test, a solute transport model simulation was conducted to account for mechanisms such as dispersion and advection. The solute transport model was run using the same IM-3 hydraulic stresses as the groundwater flow model for a 5 year period. A theoretical conservative tracer was simulated without sorption or degradation originating at the MW-54 location in model layers 3 and 4. This transport analysis indicates that in order for an average concentration of 10 ppb (typical detection limit for bromide) tracer to arrive at PE-1 after 5 years, approximately 58,000 gallons of 2,000 ppm tracer would need to be introduced at MW-54. This would only be indicative of the arrival of the leading edge of the tracer mass. Significantly more than 5 years would be needed to observe the arrival of the center of the tracer mass and observe the tailing off of the concentrations, which is necessary in order do any quantitative analysis of a tracer test.

Based on the model simulations, it is apparent that a relatively significant volume of tracer and a long period of time would be needed to conduct a tracer test beneath the river. While a tracer test conducted under IM-3 gradients may show hydraulic connection, it is not representative of final remedy pumping conditions and will neither confirm nor refute the basis for the need for monitoring wells MW-

X and Y. Injecting a large volume of tracer that could linger in the aquifer for decades also increases the risk of tracer emerging in the river or arriving at future pumping wells.

Water Level Monitoring and "Snapshot" Contour Maps

As discussed earlier in this technical memorandum, continuous water level data are available from MW-54 and MW-55 wells, however it is not possible to get water levels from the slant wells with sufficient accuracy to support contouring with other wells at the site. The whitepaper recommends "snapshot" water level contour plots using water levels from a specific hour of the day. It is not clear what insight could be gained from this. Each hour of the day would show a different set of water level contours as the river signal propagated through the aquifer. While it is possible to gain insights and even develop estimates of hydraulic parameters by observation of aquifer response to changing river levels, these insights cannot be gained through snapshot contour plots, but rather by comparison of water level hydrographs to the river hydrograph. This hydrograph approach was used during model calibration to estimate hydraulic properties in the floodplain. Without a better understanding of how the interpretations would be used, PG&E does not see value in producing hourly water level contour plots.

Model Revisions

The whitepaper has many recommendations for revisions to the model, including use of different model packages and codes, revisions to the model structure, recalibration, validation, and optimization of the model. As noted above, the model has developed over a decade and will continue to be updated throughout the implementation and operation of the final remedy. The current model was initially built (as a flow model) to support comparison of remedial alternatives in the FS, then later augmented to provide solute transport capability in support of the design of the final remedy. It is anticipated that as new data become available and the project objectives change, the model will continue be improved and the recommendations in the whitepaper, along with others, will be considered at each step. Some of the recommendations, such as incorporating density dependent flow, could render the model unwieldy and therefore less useful as a tool for remedy design and operation. Others could add value and therefore be warranted. Each revision will be evaluated according to the model objectives at that particular time. Based on that evaluation, changes that could make the model less usable for its intended purpose and provide no greater accuracy should not be implemented.

Summary

The whitepaper appears to reflect some misunderstanding of groundwater flow patterns, model boundary conditions, and constraints on operation of the IRZ near pumping wells. It is hoped that this memo has provided some clarification of these issues. The whitepaper offers a number of recommendations for improvements to the Topock groundwater models which should be evaluated during future model revisions and updates. However, the need for and location of MW-X and MW-Y were not based exclusively on the model. Until the final remedy is installed and operating, it won't be possible to validate the model projections of capture zone extent and flow patterns associated with the river bank wells or the pumping in Arizona. Therefore, the need for MW-X and MW-Y cannot be negated by any improvements that could be done to the model at the present time. Analysis shows that the proposed tracer test could likely not be completed before IM-3 is scheduled to be shut down, might result in tracer eventually emerging in the river or in future supply wells, and would likely not yield data pertinent to the operation of the final remedy.

Response to PG&E August 14, 2015 Response to July 15, 2015 MW-X and MW-Y Whitepaper

Friday, August 21, 2015

Robert H. Prucha, PhD, PE (TRC)

Margaret R. Eggers, PhD, PG, CHG (TRC)

1) Evaluating tracer movement, timing and breakthrough with the current model is flawed, due to incorrect setup of several model inputs, highly uncertain parameterization and lack of any sensitivity/uncertainty analysis beneath river and in Arizona to qualify results.
    a. Flow and fate/transport model parameters have still not been calibrated to the available well data in Arizona or the near decade of IM-3 data in California. The latest PGE documents confirm this. Standard calibration statistics have still not been provided to stakeholders in any available online reports. Based on limited plots showing observed and simulated groundwater levels, model errors exceed 1 foot in key areas, like MW-34-80 (see page 50 of MW-X/MW-Y white paper). As a result, the model or the tracer test results cannot be relied upon. This is magnified by the strong sensitivity of tracer flow paths and times to gradient.
    b. The whole point to the proposed tracer test was evaluate model performance in a critical area of the model. It was not to use the current flawed model to demonstrate that a tracer test is not feasible. The tracer test was proposed in an effort to fill a glaring data gap, including:
        i. evaluate the potential for and nature of any hydraulic connection, particularly given the complex and poorly known hydraulic conductivity and riverbed conductance beneath river and in Arizona.
        ii. utilize the tracer results to revise the existing model. Using the existing model (un-calibrated in Arizona, and in need of several corrections) to calculate breakthrough times and flow paths under existing IM-3 extraction or proposed remediation, with average riverbank extraction rates (knowing these could be increased to reduce bypass) is flawed.
        iii. use the updated, improved model to re-evaluate the need for and valid locations for MW-X/MW-Y.
    c. Based on available data, reasonable estimated of hydraulic conductivity, and a simple Darcy velocity calculation, tracer breakthrough times were estimated at between 41 and 471 days, (See Table 1).
    d. There is no guarantee that:
        i. tracer movement could be greatly enhanced by continuously injecting water and increasing the gradient from MW-54 to MW-34. The challenge would be finding a source of water to inject into the well (river?). We originally assumed gradients resulting only from the existing IM-3 continuous extraction.
        ii. These high values seem very possible given the conceptual basis suggested in the August 11, 2015 CH2MHill Technical Memo clarifying details on aquifer test interpretations in Arizona. The memo suggests highly conductive gravels from Sacramento Wash moved into the Colorado floodplain and were deposited as shown on Figure 3. The problem is that the actual area of the high conductivity zone is arbitrarily assumed, as the model is not calibrated in Arizona. More likely the area of high conductivity extends into the actual Colorado River, coincidently, right across from where the Topock Marsh drains into the Colorado River. This is also roughly where the CrVI plume from California

appears to have migrated furthest to the east at the edge of the river AND where the high permeability zone in Layer 3 extends beneath the river, but then abruptly transitions into lower permeability material with no justification (Figure 2).

2) It is strange that the conclusion is now that IM-3 shutdown test resulted in no clear response in Arizona. It appears that the lack of connection is now used to justify not conducting a tracer test.

3) The conceptual model of 90% of Mohave Lake Basin flow through a hypothesized paleochannel (see Figure 4), based on unpublished discussions with USGS and no data, is surprising. No previous mention of this feature and it's important implications seems contradictory to previous conclusions in available documents. Figure 5 shows inferred bedrock surface elevation contours which suggest groundwater flows would still be directed beneath the Topock Gorge, as it is more deeply incised in this area. It is unclear why important details, for example, groundwater contours, mass balance, and calibration have still never been provided for the AZ side of the river provided earlier. As Prucha and Eggers (July 15, 2015) point out in their whitepaper, key specified or calculated water flows into/out of the model seem much too low, such as the estimated 3 gpm beneath the entire Colorado River at the southern end of the regional model (see Figure 6).

   It is equally unclear why an evaluation of the effects of alternative conceptual models in AZ (i.e., different paleochannel configurations) on proposed remedial design and system operation have not been conducted. Such predictions increase the level of transparency to all stakeholders on critical issues, such as the likelihood, extent and nature of any CrVI or byproducts that may be pushed into Arizona waters. Results of this analysis would be very relevant to all stakeholders now rather than after the system has been built. During the TWG meeting on August 19, 2015, PGE Consultant Martin Barackman indicated that calibration in the California proposed remediation area showed no difference when the hypothesized paleochannel was either included or left out. We strongly recommend that PGE Consultants review ASTM Standard D-5611 94 (Standard Guide for Conducting a Sensitivity Analysis for a Ground-Water Flow Model Application) on how to conduct such a predictive sensitivity analysis and to assess implications of having similar calibration results for different model setups, but differing predictions (i.e., a paleochannel vs. no paleochannel).

4) Only a select number of model deficiencies were discussed. The key deficiencies weren't addressed, and obvious corrections should be made to the model before utilizing it to assess any flow and/or fate/transport conditions beneath or across the river. At a minimum, if any results are shown, the model should be calibrated in this area and an uncertainty analysis performed on all predictions.

5) What are the realistic ramifications of tracer detections in the Marina well? The Marina well is only hypothetical – but would this really be something that would occur, given the increasing CrVI levels at MW-55 and MW-56 and the possibility and significant uncertainty for breakthrough from California to Arizona?

6) The point to MW-X/MW-Y is still unclear. For example:

   a. What does the existing model predict for the range of CrVI concentrations in that area? We expect any by-pass concentrations would be low and likely well within observed range of background CrVI. Therefore, how could these wells actually be considered "sentinel' wells?
   b. Data from wells MW-54, MW-55 and MW-56 were never used to calibrate the model, even after 10 years of data collection. In addition, the recent August 14, 2015 Technical Memorandum from Martin Barackman and Mike Cavaliere entitled "PG&E Response to MW-X and MW-Y Whitepaper" concludes that no discernible drawdown is observed in wells MW-54, MW-55 or MW-56 despite continuous 130 gpm extraction at IM-3 pumping wells. The total proposed Riverbank well extraction is only 150 gpm, but distributed over 5 wells. Any impact on drawdown at proposed monitoring wells MW-X and MW-Y will likely be even less than the negligible, if any, response at MW-54. The MW-54 data were initially thought to indicate some affect from IM-3 pumping, but later any impact was deemed to be so negligible as to be indistinguishable from variations in the fluctuating river level. In fact, it is likely that any affect from the IRL injection wells would be difficult to discern given the overlapping effects of river stage fluctuations, ET, well extraction at Riverbank wells, HNWR-1A, Site B and other production wells. So again, we strongly believe any water level data at MW-X or MW-Y would provide little value as either a sentinel monitoring well to monitor riverbank extraction performance, or to improve the conceptual site model or the numerical model.
7) What are details of the plan if CrVI is detected in AZ and attributed to California source?
   a. Once detected at MW-X and MW-Y, additional wells would be needed to characterize the extent of any new plume propagation and configuration within Arizona. The number and location(s) of additional wells is unknown.
   b. What would be the remediation plan in Arizona? The current proposed California remediation River-Bank extraction system would likely be unable to capture the Arizona contamination without compromising the performance objectives within California. If River-bank extraction rates are increased in an attempt to capture Arizona by-pass contaminants, this would increase the potential negative effects in the remediation system, such as striping, or increased by-pass.
   c. Not remediating all Arizona contamination (CrVI, Mn, As, etc.) violates RAOs. Would this additional remediation involve pump and treat in Arizona? Certainly some amount of additional infrastructure, roads, buildings, contractor activities etc., would be needed in Arizona.
   d. Worst case scenarios should be considered in any decision to install new monitoring wells in Arizona. At a minimum, the current entire proposed remediation design really needs to be re-thought here. Certainly, the possibility of expansion of the plume into Arizona was not considered during the early process of remedy selection.
8) A key recommendation at this point, which is echoed in comments by DOI consultant David Back, is to simply wait to determine the need, number and locations of any additional Arizona groundwater monitoring wells (i.e., MW-X and MW-Y), until new data is collected during system construction and startup testing. After the model is updated and re-calibrated, various

scenarios can be run and explored to evaluate possible locations in Arizona. We fundamentally believe that fixing all of the model issues now, and re-calibrating to available Arizona groundwater and the nearly 10-years of IM-3 data, is crucial to maintaining the model as a predictive tool. Proposed remediation design and operating scenarios can then be simulated which incorporate a fluctuating river and different conceptual models of the poorly characterized subsurface system in Arizona. Scenarios might be run with or without a permeable paleochannel, or extending the high permeability (500-900 ft/d) material from Sacramento Wash into the Colorado River and connecting it with the MW-34 well area material. Such applications of an improved model would provide the necessary confidence to all parties that the model predictions, as well as the remedy as designed, will function as planned. Once the remedy is installed, it will be too late to avoid unnecessary components, and additional wells and infrastructure may be needed to address unforeseen shortcomings in the system.

9) How much tracer volume is really required to see tracer compound detections at CA wells? The >50,000 gallons estimated by PG&E consultants seems highly excessive.

The high volume estimate included an assumption of 35% porosity – initialized both mobile and immobile. Initializing this with a more realistic effective porosity of 12% would greatly reduce tracer volume required. The estimate was made by modeling one addition of tracer into a single 25’ x 25’ model cell instead of using an actual well borehole volume. This seems to have only been done for the purpose of doing the estimation within the model itself. Evaluating this same situation but using the well borehole volume for a 4-inch to 12-inch well seems more appropriate, and more realistically, and greatly reduces, the estimated tracer volume required. We believe much lower injected volumes would be needed to produce detectable concentrations at wells near MW-34 in California (IM-3 Area).

Table 1. Estimated Tracer Breakthrough Times

Approximate Distance from MW-34 to MW-54 (ft)[1] 770
Effective (mobile) Porosity 0.12

	Kh (ft/d)	Year	Avg. Annual Head, ft (mw-34-100)	(mw-54-195)	Gradient ft/ft	Velocity ft/d	Breakthrough days
High K value between mw-34 and mw-54, Layer 3[2]	175	2014	452.16	453.78	0.0021	3.07	250.96
High K value between mw-34 and mw-54, Layer 3[2]	175	2013	451.71	453.62	0.0025	3.62	212.86
High K value between mw-34 and mw-54, Layer 3[2]	175	2012	451.97	453.48	0.0020	2.86	269.25
Minimum K between mw-34 and mw-54, Layer 3[2]	100	2014	452.16	453.78	0.0021	1.75	439.19
Minimum K between mw-34 and mw-54, Layer 3[2]	100	2013	451.71	453.62	0.0025	2.07	372.50
Minimum K between mw-34 and mw-54, Layer 3[2]	100	2012	451.97	453.48	0.0020	1.63	471.18
Site B, Table 2, Layer 4[3]	900	2014	452.16	453.78	0.0021	15.78	48.80
Site B, Table 2, Layer 4[3]	900	2013	451.71	453.62	0.0025	18.60	41.39
Site B, Table 2, Layer 4[3]	900	2012	451.97	453.48	0.0020	14.71	52.35
Topock-2/-3, Table 2, Layer 1[3]	160	2014	452.16	453.78	0.0021	2.81	274.49
Topock-2/-3, Table 2, Layer 1[3]	160	2013	451.71	453.62	0.0025	3.31	232.81
Topock-2/-3, Table 2, Layer 1[3]	160	2012	451.97	453.48	0.0020	2.61	294.49
Site B, Table 2, Layer 3[3]	500	2014	452.16	453.78	0.0021	8.77	87.84
Site B, Table 2, Layer 3[3]	500	2013	451.71	453.62	0.0025	10.34	74.50
Site B, Table 2, Layer 3[3]	500	2012	451.97	453.48	0.0020	8.17	94.24

Note 1. See Figure 1 for distance between MW-34 and MW-54.
Note 2. See Figure 2 for the values and distribution of conductivities in model layer 3 between MW-34 and MW-54.
Note 3. See CH2MHill, August 11, 2015. Technical Memorandum from Martin Barackman to PG&E. "Additional Details on Aquifer Test Interpretation and Groundwater Flow Model Updates for the Arizona Portion of the Topock Remediation Project Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California"

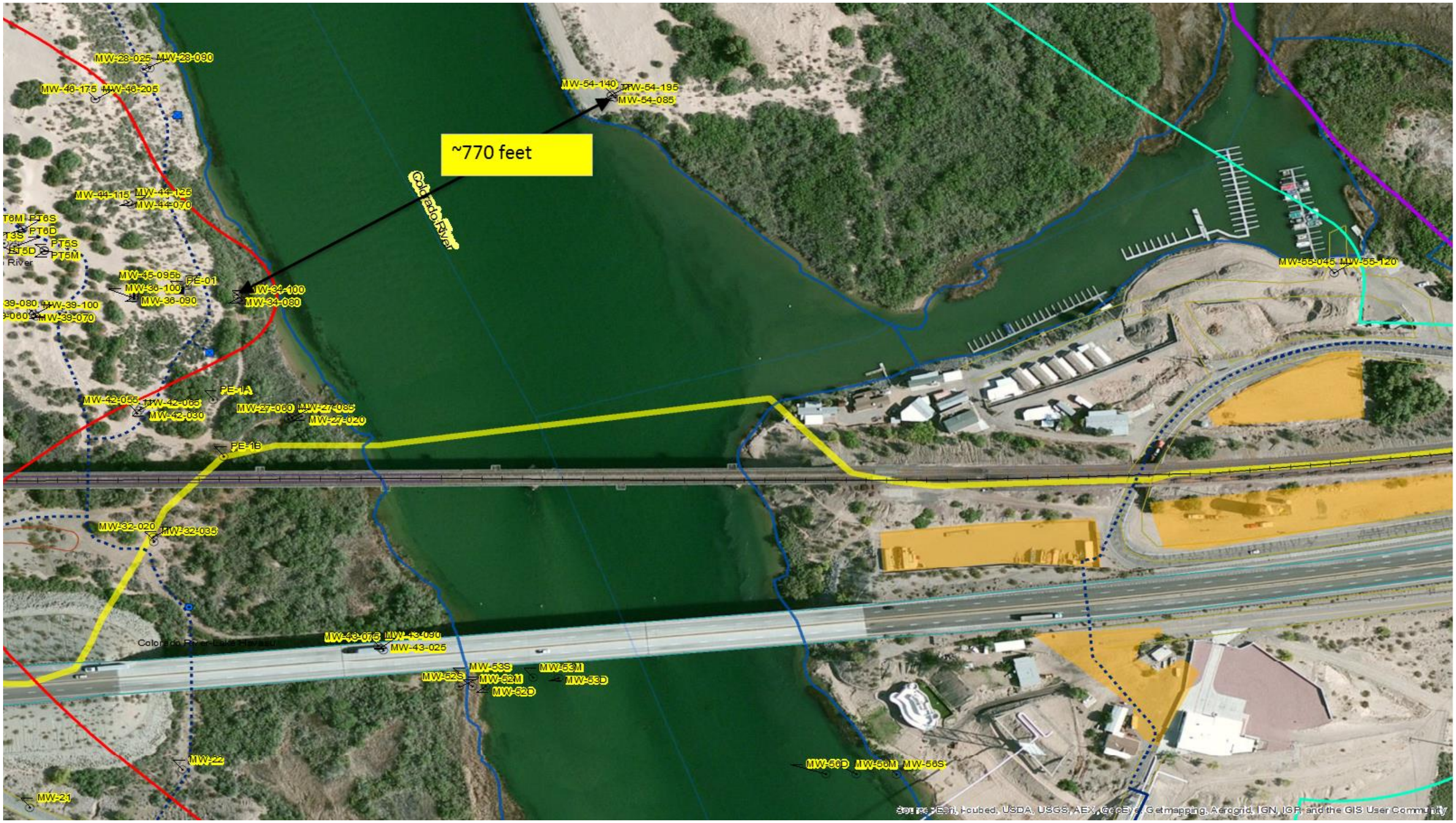

Figure 1. Shows distance between wells MW-34 (California) and MW-54 (Arizona).

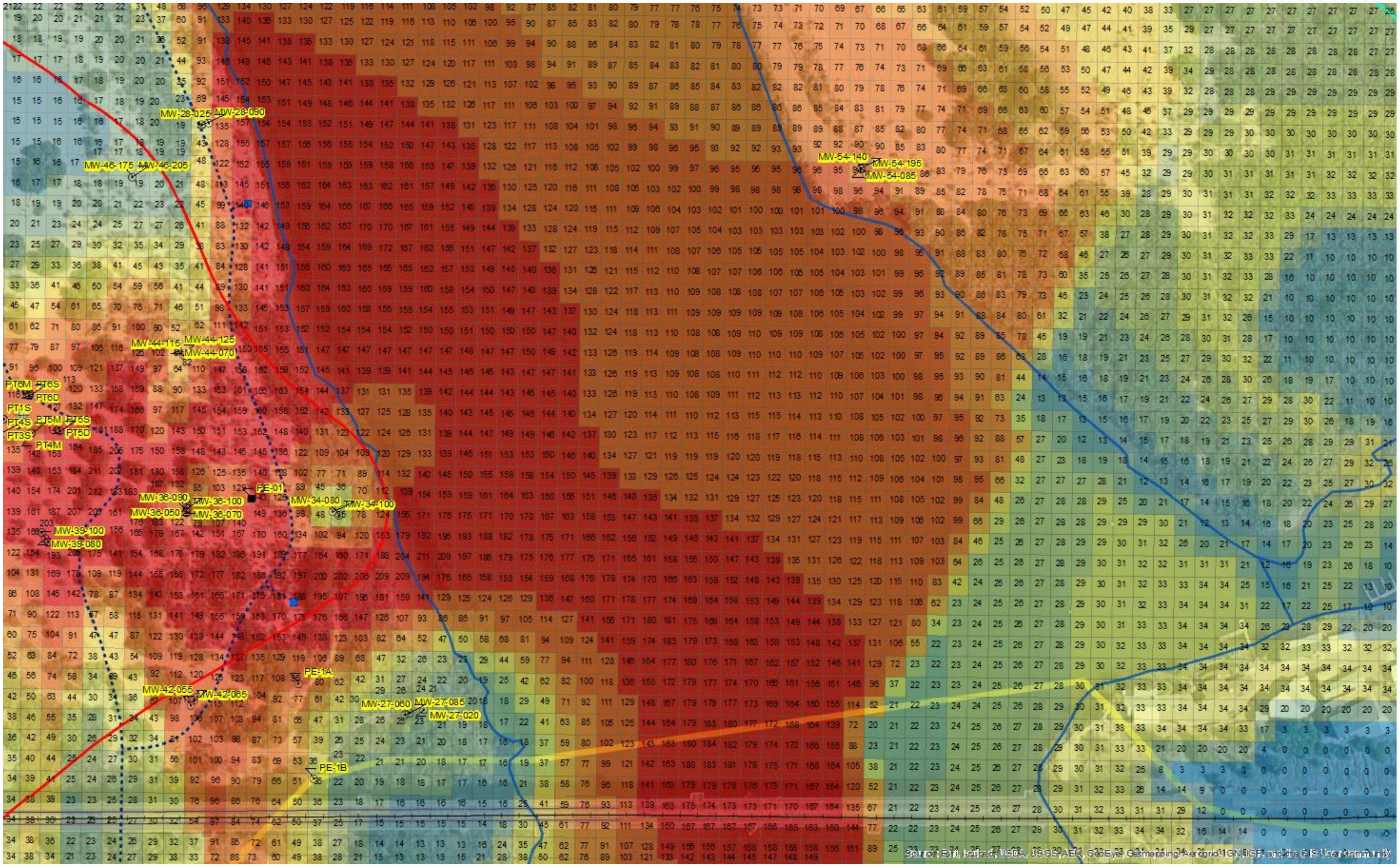

Figure 2. Shows 60%BOD Modflow Model Layer 3 Hydraulic Conductivity Values Between MW-34 and MW-54 (ft/d).

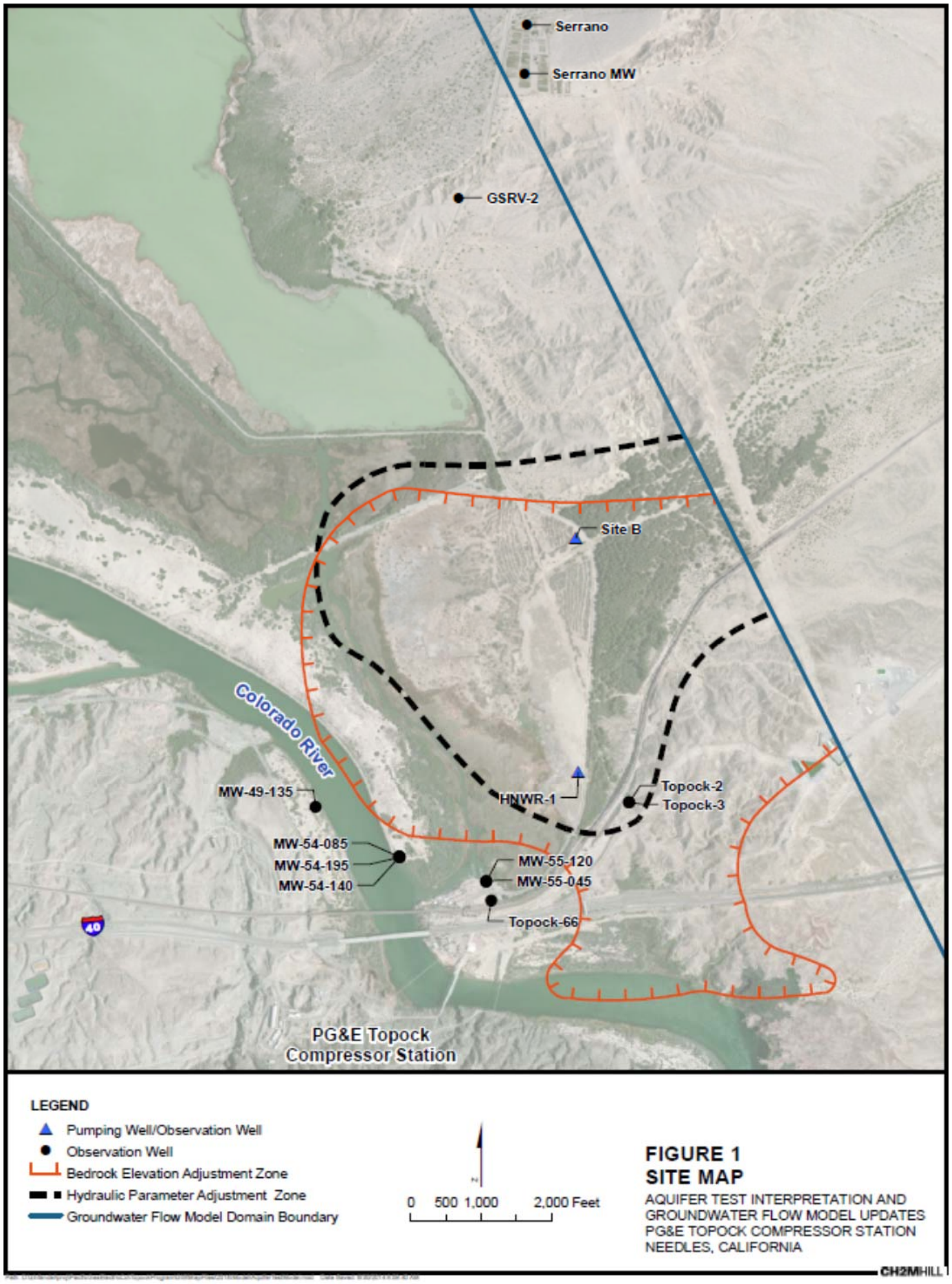

Figure 3. Hydraulic Parameter Adjustment Zone – where high hydraulic conductivity assigned, but arbitrary given no calibration east of River.

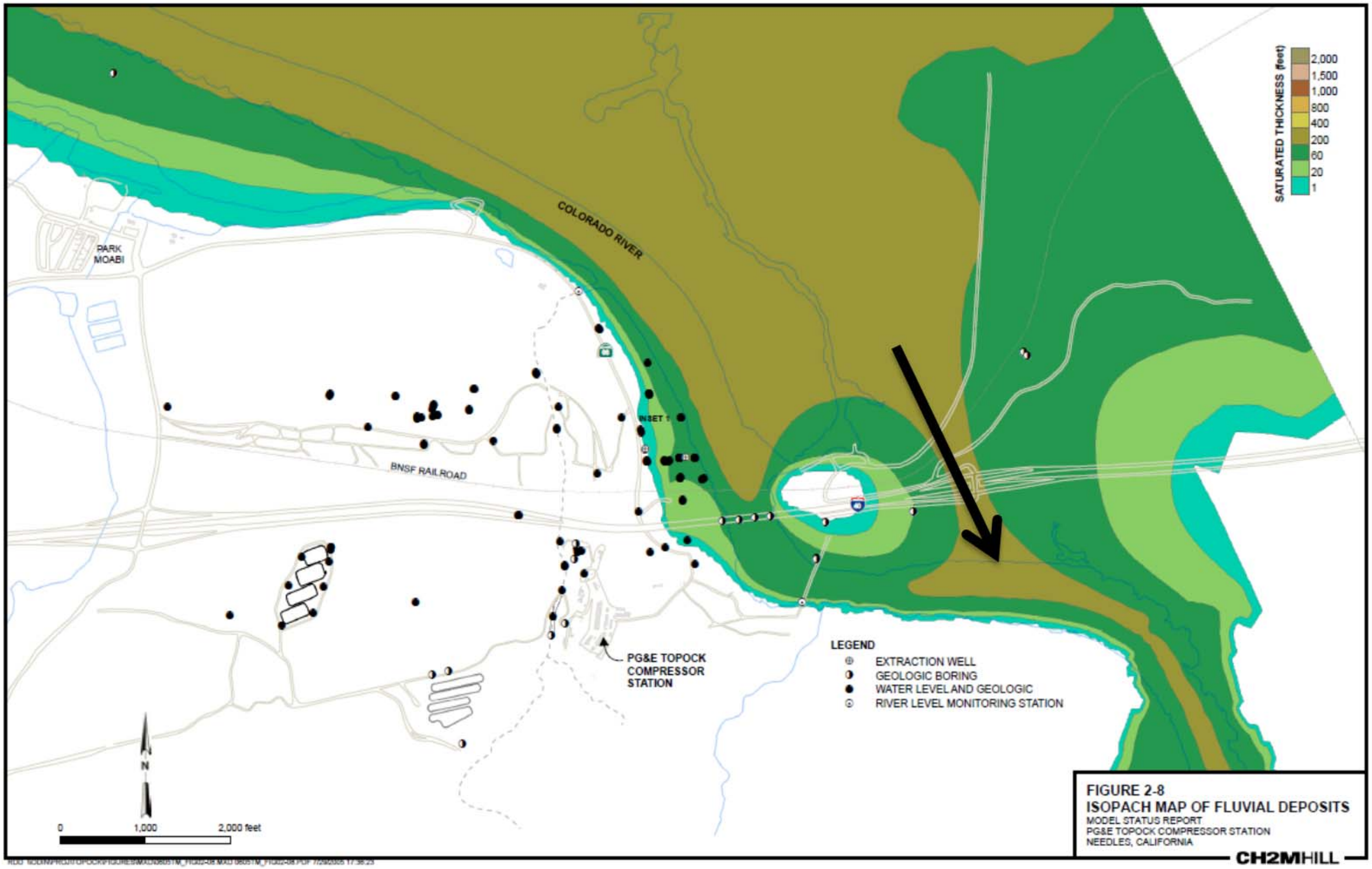

Figure 4. Shows assumed Fluvial Deposit (black arrow), through which CH2MHill argues 90% of groundwater from entire Mohave GW system discharges to the south and into material beneath Colorado River. However – there are no data to support this, no CrVI has been detected in AZ from California which seem more likely given increased potential flow from PGE site to this fluvial outlet. GW contours don't seem to support this concept (i.e., MW-54, -55 and -56 are oriented towards Colorado River (natural gradient if discharge is via Colorado River in lower aquifer)).

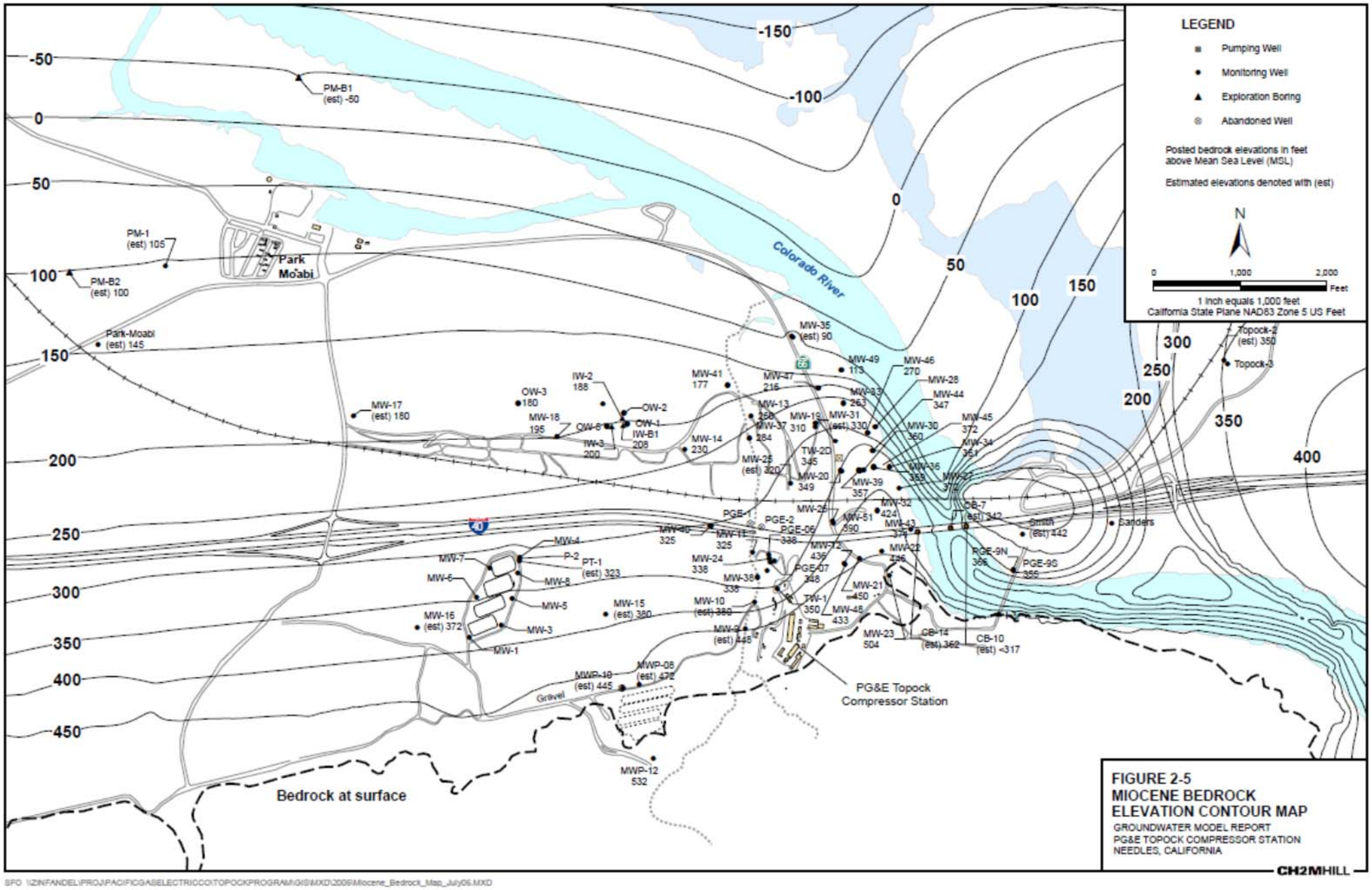

Figure 5. The estimated bedrock surface, revised with USGS seismic data suggests the primary discharge area is through the Topock Gorge, versus through the paleochannel, hypothesized immediately south of the Topock Marsh, east of Topock Marina, which connects up with the Colorado River to the south.

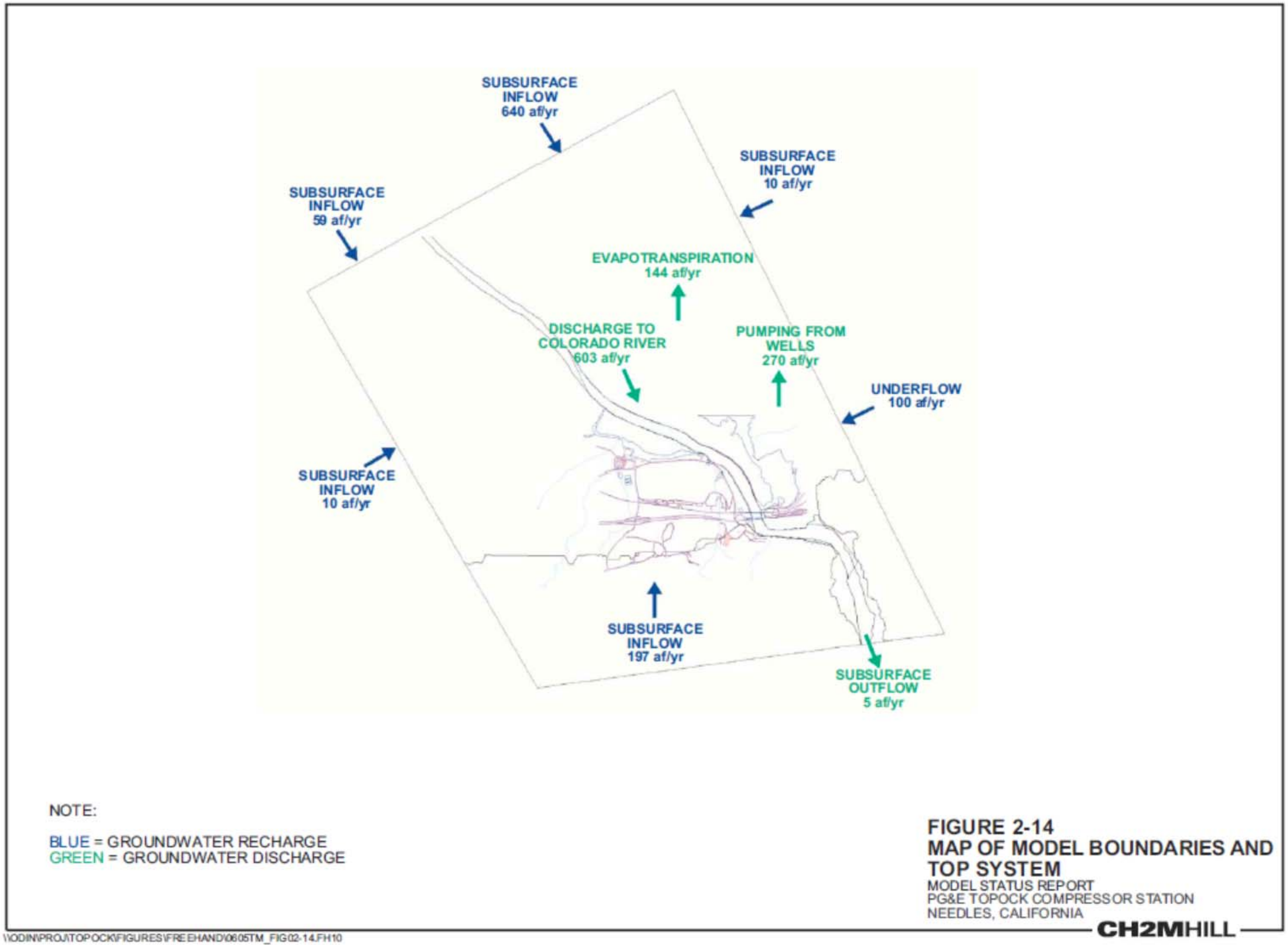

Figure 6. Shows Calibrated model external water balance specifications. Subsurface outflow is only 5 ac-ft/yr beneath Colorado River. This equates to only 3 GPM, or a low flow garden shower. Conceptually this appears unrealistically lower than might be expected below the mighty Colorado River, nearly 3 football fields wide.

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

Office of the General Manager

September 10, 2015

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Dear Mr. Yue and Ms. Innis:

Topock Groundwater Remediation Project
Response to Comments on the 90 Percent Design Documents

The Metropolitan Water District of Southern California (Metropolitan) appreciates the opportunity to submit comments for your agencies' consideration in providing direction to Pacific Gas and Electric (PG&E) on the final design for the groundwater remediation project at the PG&E Topock Gas Compressor Station site. On June 26, 2015, we received the Response to Comments (RTC) on the 90 Percent Design Documents and have participated in subsequent Technical Work Group (TWG) meetings, held in July and August 2015, focused on resolving outstanding project concerns. Metropolitan's 90 percent design comments have been adequately addressed in the RTC. We are providing additional comments below, based on recent TWG discussions regarding the proposed MW-X and MW-Y monitoring wells and construction sequencing.

Comment 1

Metropolitan affirms the critical need for monitoring wells, MW-X and MW-Y. The groundwater remedy involves accelerating groundwater flow eastward, towards an In-situ Reactive Zone (IRZ) located west of the Colorado River in California. Monitoring wells, MW-X and MW-Y, are proposed to be located downgradient from the remediation zone and east of the Colorado River in Arizona. We agree with the Department of Toxic Substances Control's (DTSC's) determination (per RTC table comments #10 and #17) that the wells are needed to establish baseline concentrations for water quality and to monitor for chromium-6 and byproducts generated from treatment downgradient of the remediation zone. Overall, the MW-X and MW-Y wells would serve as sentinel wells to confirm hydraulic gradient and capture in the remediation zone and to ensure protection of the Colorado River.

Comment 2
At the August 27, 2015 TWG meeting, PG&E presented a proposed construction sequence schedule that would involve shut-down of the Interim Measure 3 (IM-3) treatment and start-up of the IRZ operations, almost two years prior to completion of the groundwater remediation system and the start-up of the riverbank extraction wells. Metropolitan understands the importance of shutting down IM-3 sooner to be able to evaluate the IRZ start-up without influence from IM-3 extraction and to collect additional information needed to refine the groundwater remedy construction. However, we are concerned with the potential for IRZ to not perform as modeled. If groundwater movement and transport of chromium-6 and remedy byproducts are not as predicted and instead they move significantly towards the Colorado River prior to PG&E completing construction of all groundwater remedy components, the riverbank wells will be needed as a contingency to protect the Colorado River. Metropolitan requests that PG&E consider the installation of the riverbank wells a priority in the construction sequence and that these wells be available for pumping when IM-3 is shut-down and IRZ begins operation.

We thank DTSC and the U.S. Department of the Interior (DOI) for considering our comments in providing direction to PG&E on the final design. Also, we value DTSC and DOI's extensive collaboration with stakeholders to adequately address outstanding project concerns, while ensuring that the final remedy moves forward in a timely manner. If you have any questions, please contact me at (213) 217-5646 or bkoch@mwdh2o.com.

Very truly yours,

Bart Koch

Bart Koch
Section Manager, Operational Safety & Environmental Services

BK:dp
W:Koch/BK_Topock comment letter 2015.docx

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Appendix I
Responses to Comments on the Basis of Design Report/Intermediate (60%) Design Submittal

TABLE I-1
Response to Comments on Basis of Design Report/Intermediate (60%) Design
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item	Comment Number	Section/ Page	Reference Text	60% Design Comment	PG&E Response to 60% Design Comments	DTSC Response to 60% Design Comments	DOI Response to 60% Design Comments	Tribe Response to 60% Design Comments	Final Comment Resolution	Where responses are reflected in the 90% design documents?
General Comments										
1	DOI-1	General		A final decision is necessary regarding above ground versus below ground piping in the uplands area and for the fresh water pipeline. In order to adequately evaluate the differences between the options, DOI, in consultation with interested Tribes, is submitting a matrix of evaluation factors to use in comparing the current design and three above ground pipeline options. Proposed evaluation criteria are also included. Please complete the pipeline matrix evaluation for use during comment resolution and final consideration of the pipeline layout. When completing the evaluation of alternatives, for each criterion consider all aspects of the project in the evaluation, including handling and storage of residual soils. Please see Attachment A – Above ground/below ground pipeline evaluation matrix.	See information included in DOI's pipeline evaluation matrix and associated visualizations (included in **Attachment A**, at the end of this table).			The FMIT, the Hualapai Tribe, and the Cocopah Indian Tribe each provided the tribe's assessment and comments on the alternative pipeline routings. The CRIT also provided feedback via email on this subject. The Tribes' letters and email are included in **Attachment A**, at the end of this table.	Information presented in DOI's pipeline evaluation matrix and associated visualizations were discussed with the agencies, Tribes, and stakeholders at the November 19-20, 2013 TWG meeting. Tribes' response was presented at the December 17-18, 2013 TWG meeting and subsequently provided in a draft technical memorandum from TRC (Charlie Schlinger) to PG&E, DTSC and DOI/BLM dated Dec 17, 2013 (also included in **Attachment A**, at the end of this table). A site walk was held on Dec 27, 2013 to further discuss the piping options. Representatives from DOI, FMIT, Hualapai Tribe, Chemehuevi Tribe, TRC, and PG&E participated in the site walk. A presentation was made by TRC (Charlie Schlinger) at the January 23, 2014 TWG meeting (presentation materials are included in **Attachment A**, at the end of this table). Additional analysis was performed by PG&E on Segments 1 and 2 of Pipeline A, and presented at the February 11, 2014 TWG meeting. Presentation materials are also included in **Attachment A**, at the end of this table.	The 90% design complies with the Agencies' directive on aboveground/belowground pipeline infrastructure in the April 4, 2014 letter titled *"Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site"*.
2	DOI-2	General		In correspondence dated October 23, 2008 from DOI to PG&E (Attachment B) regarding the National Wildlife Refuge System Administration Act and the corresponding Appropriate Use Analysis and Compatibility Determination, FWS identified key elements that need to be evaluated during the remedial alternative analysis. These elements must also be addressed during the design. While much of the necessary information is contained within the 60% design document, it is difficult to locate. In order to memorialize that these	See attached table titled *Supplemental Information for ARAR #7_AUA_CD* (included in **Attachment B**, at the end of this table).		Comment resolved pending review of the 90% design.		Comment resolved.	Updated information is included in Table 6.2-1A of the 90% BOD, titled "*Information for the Havasu National Wildlife Refuge's Appropriate Use Analysis and Compatibility Determination (AUA/CD)*".

TABLE I-1
Response to Comments on Basis of Design Report/Intermediate (60%) Design
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item	Comment Number	Section/ Page	Reference Text	60% Design Comment	PG&E Response to 60% Design Comments	DTSC Response to 60% Design Comments	DOI Response to 60% Design Comments	Tribe Response to 60% Design Comments	Final Comment Resolution	Where responses are reflected in the 90% design documents?
				elements have been addressed, please include them in the "Action Section" of the ARAR tables, Item 7, and identify or reference the actions specified in the current design. Additionally, for the remaining elements, please identify proposed actions to be included within the 90% design submittal.						
3	DOI-3	General		When referring reader back to an Appendix, it is recommended that the exact location, (e.g., page number or Section number), be provided to enable readers to easily search for the referenced information.	Comment noted.		Comment resolved.		Comment resolved.	Section numbers have been added to Appendix references throughout the 90% documents.
4	DOI-4	General	Time to remediate plume	With regards to the timeline for remediating the plume, a 30-year period is discussed; however, the number of pore volume flushes is not. The number of pore volumes provides the reader with a more tangible sense of the hydrodynamics of the system. Please provide a discussion regarding the number of pore volume flushes in the text.	The following sentence will be added to the text: "Based on an average groundwater flow velocity of 1 ft/d, a total of approximately 6 pore volumes flushes are projected to occur over the 30 year period of remediation." Because the remedy involves active remediation of the hexavalent chromium through carbon amendment, the performance of the remedy is not solely dependent on groundwater pore flushes, but rather the active geochemical reactions in conjunction with groundwater flushing.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Apdx B Section 6.4.
5	DOI-5	General		Some in-text citations have commas and others do not. A single format should be chosen, and then review and modify the document for consistency.	Comment noted. The current convention is in-text citation without commas in the 60% BOD and this will continue into the 90% BOD. Citations will be reviewed and any with stray commas will be corrected. Editing/modification of a previously published report (published prior to the BOD but included as an appendix), for the sole purpose of updating its citation convention is not warranted.		Comment resolved.		Comment resolved.	Corrections have been made as indicated in the response.
6	FMIT-1 Hualapai-1 Chemehuevi-1 Cocopah-1 CRIT-1	General		A conceptual narrative for the anticipated steps in the decommissioning of this proposed remedy should be included to assist in both evaluating the design elements and how they would impact removal of the remedy infrastructure, and in evaluating the total, cumulative impacts of this project.	A narrative for the approach of the steps to decommissioning of the proposed remedy will be provided in the 90% design.			Comment resolved pending review of the 90% design. Tribes request that, if possible, this information be provided prior to submittal of the 90% design.	Comment resolved.	A narrative was developed in response to this comment. See **Attachments T** at the end of this table.

TABLE I-1
Response to Comments on Basis of Design Report/Intermediate (60%) Design
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

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7	FMIT-2 Hualapai-2 Chemehuevi-2 Cocopah-2 CRIT-2	General		The Response to Comment process (for the 60% Basis of Design report) and the following development of the 90% Basis of Design report needs to include face-to-face consultation with tribes to document/demonstrate that tribal issues/criteria are being addressed.	Comment noted. As discussed at the July 18, 2013 TWG meeting, face-to-face meetings will be held to discuss and resolve comments on the 60% design. PG&E defers to DOI on Tribes' request for consultation.		As noted by PG&E, face-to-face comment resolution meetings have been scheduled for the 60% design. In addition, DOI and BLM have scheduled a face-to-face meeting to discuss the RTCs with the Tribes coinciding with the October 29, 2013 CHPMP meeting. We also anticipate Technical Working Group (TWG) meeting in between comment resolution and the 90% design deliverable.	Okay.	Comment resolved.	Not applicable ***Note to BOD Reviewers - As indicated in RTC #485 FMIT-148, when the "Final Comment Resolution" indicates "Comment resolved" and this column indicates "Not applicable", it means that the comment has been resolved and there is no need for modify the cited text/ tables/ figures in the next iteration of the BOD. For brevity, this note will not be repeated throughout this RTC table.***
8a	FMIT-3	General		It is apparent from a comparison of comments the Tribe issued for the 30% BOD and the 60% BOD document that the alternative designs of certain project components certain that the Tribe expressed preferences because they related to tribal religious and cultural issues were not factored or substantively considered in engineering designs. At a minimum, equal scientific/engineering rigor should be given to these legitimate alternate design constraints. For example, the Tribes expressed strong preferences for above-ground utility routings, however, the utility routings in the 60% BOD are almost exclusively routed below ground. Additionally, at one of the TWG meetings, PG&E provided a screening matrix for alternative routings in the East Ravine area. While this type of decision information is quite helpful in understanding the underlying decision rationale, it does not factor in tribal preferences.	The preference stated by the FMIT and by other tribes for aboveground facilities was substantively considered in formulating the 60% design. PG&E believes that the proposed 60% design represents the most practical design in the Topock site setting, which incorporates the Tribes' preferences to the extent practicable, is most protective of remedy infrastructure, most O&M friendly for the decades-long life of this remedy, and most consistent with the certified EIR. As documented in the 30% RTC table (60% BOD Appendix I), PG&E has incorporated Tribal preferences to eliminate the BCW trenching (an area that is in close proximity to the Topock Maze), to relocate wells in the upland (one of these well relocations requires building a new access road into a wash) (RTC #185 HA-36), as well as to reduce the number of transformers and site all transformers aboveground (RTC #183 HA-34). Regarding the topic of aboveground vs. belowground, this was discussed with Agencies and Tribes during the 3/20/2012 meeting and the 30% design comment resolution meetings. PG&E's rationale for below-ground construction is well documented in 30% RTC #159 HA-21, #182 HA-33.			Comment resolved.	Comment resolved.	The 90% design complies with the Agencies' directive on aboveground/ belowground pipeline infrastructure in the April 4, 2014 letter titled *"Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site"*.

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Response to Comments on Basis of Design Report/Intermediate (60%) Design

Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design

PG&E Topock Compressor Station, Needles, California

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					PG&E has and will continue to collaborate with Tribes and Agencies towards a satisfactory resolution of Tribal concerns. More specific evaluation of aboveground piping alternatives is provided in the response to comment #1 DOI-1.					
8b	Hualapai-3 Chemehuevi-3 Cocopah-3 CRIT-3	General		It is apparent from the 30% to the 60% designs that certain tribal preferences relating to tribal religious and cultural issues were not factored or substantively considered in engineering designs. At a minimum, equal scientific/ engineering rigor should be given to these legitimate alternate design constraints. For example, the Tribes expressed strong preferences for above-ground utility routings, however, the utility routings in the 60% BOD are almost exclusively routed below ground. Additionally, at one of the TWG meetings, PG&E provided a screening matrix for alternative routings in the East Ravine area. While this type of decision information is quite helpful in understanding the underlying decision rationale, it does not factor in tribal preferences.	See response to comment #8a FMIT-3.			Comment resolved.	Comment resolved.	The 90% design complies with the Agencies' directive on aboveground/ belowground pipeline infrastructure in the April 4, 2014 letter titled *"Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site"*.
9	FMIT-4 Hualapai-4 Chemehuevi-4 Cocopah-4 CRIT-4	General		The Tribes expect that both short-term and long- term disturbances to the ground surface and below ground be avoided and minimized. Subsurface disturbances permanently change the natural order of the land and require disruptive removal of these utilities once the remedy is complete. Invasive subsurface disturbances need to be avoided to the extent practicable. Installation of remedial infrastructure on the ground surface itself needs to be minimized in terms of its footprint. The Tribes have provided input on their preferences for installation methods in comments on the 30% BOD that call for minimization of subsurface disturbances.	PG&E understands the importance of and appreciates the Tribes' position on avoidance and minimization of subsurface disturbance. To this end, PG&E notes that while there is short-term disturbance associated with the construction/removal of belowground utilities, there is less disturbance in the long-term associated with O&M. Aboveground utilities will inherently require more maintenance than belowground utilities, especially in an environment like Topock (e.g., heat, vandalism). It should also be noted that for an above ground configuration, thermal design considerations may require substantial additional footprint to allow for expansion/contraction loops as well as a potentially large support structures (e.g., pipe racks, conduits or cable tray, shade assemblies).				This comment and response are being discussed as part of the evaluation of aboveground piping alternatives (#1 DOI-1, #8a FMIT-3, and #8b Hualapai-3/ Chemehuevi-3/Cocopah-3/CRIT-3).	The 90% design complies with the Agencies' directive on aboveground/ belowground pipeline infrastructure in the April 4, 2014 letter titled *"Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site"*.

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					See also response to comments #1, DOI-1, #8a FMIT-3, and #8b Hualapai-3/ Chemehuevi-3/Cocopah-3/CRIT-3.					
10a	FMIT-5	General		Since the basic operational methods of the proposed remedy and IM-3 are fundamentally incompatible, and therefore, once the proposed remedy begins, IM-3 cannot be used. The start- up strategy for the final remedy needs to be efficient, thereby assuring the earliest possible demonstration that the remedy is “operating properly and successfully” (OPS) so that the IM3 plant can be decommissioned.	It is agreed that the transition between IM-3 and implementation of the proposed remedy is an important step, and this transition phase was considered and simulated with the solute transport model. The key criteria considered during this transition were to: 1) minimize duration of IM operation; 2) control and reduce the mass of chromium in the floodplain as quickly as possible; 3) minimize the migration of the chromium plume in the floodplain during remedy start-up; and 4) maximize control of implementation risks during initial implementation of the NTH IRZ. The simulated transition between IM-3 and the proposed remedy is presented in Section 7.3 of the 60% BOD. In this section, four potential start-up scenarios for the proposed remedy were evaluated with varying durations and remedial component order. The criteria for decommissioning IM-3 as well as the definition of “operating properly and successfully” for the purposes of the overall groundwater remedy are specified in the 2012 Settlement Agreement between DTSC and the FMIT.			Comment resolved.	Comment resolved.	Not applicable
10b	Hualapai-5 Chemehuevi-5 Cocopah-5 CRIT-5	General		The basic operational methods of the proposed remedy and IM-3 are fundamentally incompatible, and therefore, once the proposed remedy begins, IM-3 cannot be used. The start-up strategy for the final remedy needs to be efficient, thereby assuring the earliest possible demonstration that the remedy is “operating properly and successfully” (OPS) so that the IM3 facility can be decommissioned.	See response to comment #10a FMIT-5.			Comment resolved.	Comment resolved.	Not applicable
11a	FMIT-6	General		The 90% Design stage is one of the last opportunities for the Tribes to address the project design. Review of schedule projections presented in the 60% BOD report indicates that the current schedule for the 90% design review may not allow be sufficient	Comment noted. As discussed at the July 18, 2013 TWG meeting, face-to-face meetings will be held to discuss and resolve comments on the 60% design. PG&E defers decision on extension of	DTSC is committed to working with the Tribes to afford reasonable review time frames for large documents such as the BOD reports. DTSC has and will continue to maintain an open dialogue with the Tribes	DOI and BLM acknowledge the complexity of design documents and suggest an extension to the review period as well. As per the schedule	Okay with DOI’s response.	Responses noted.	Not applicable

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				time for Tribal review and consultation. The BOD documents are voluminous, with many detailed appendices which the Tribes need to review. In addition, at each stage of the design review process, sections are introduced that have not been previously seen by the reviewers. There needs to be sufficient time for the Tribal representatives, and the Tribes' technical consultants to review these documents, for the Tribes to consult both with the technical consultants, Tribal governments and elders, and with the other Tribes prior to being able to provide comments and to allow sufficient time to exercise their rights to government-to-government consultations with the agencies in regard to project impacts. An ongoing dialogue with the Tribes during the interim period between the 60% and 90% documents would be helpful as PG&E's consultants respond to comments on the 60% design. Also, the Tribe requests consultation with the agencies regarding the potential impacts of the proposed final design against the design presented in the FEIR so that there is sufficient time to discuss those impacts and treatment measures.	90% design review and FMIT's request for consultation to DOI and DTSC.	regarding the proposed project and to discuss Tribal concerns associated with the potential impacts during the remedy design. However, to effectively consider Tribal issues, DTSC encourages early communication from the Tribes on concrete concerns for consideration in advance of the project approval.	provided in the July TWG, DOI agrees that the suggested 60-day review period for the Tribes and stakeholders with an additional 15 calendar days for the agencies to review those comments prior to our comment submittal is appropriate. DOI/BLM will work with the Tribes in scheduling face-to-face consultation meetings on the 90% design documents.			
11b	Hualapai-6 Chemehuevi-6 Cocopah-6 CRIT-6	General		The 90% Design stage is one of the last opportunities for the Tribes to address the project design. Review of the 60% BOD report indicates that the current schedule for the 90% design review may not allow sufficient time for Tribal review and consultation. The BOD documents are voluminous, with many detailed appendices which the Tribes need to review. In addition, at each stage of the design review process, sections are introduced that have not been previously seen by the reviewers. There needs to be sufficient time for the Tribal representatives and the Tribes' technical consultants to review these documents, for the Tribes to consult with the technical consultants, Tribal governments and elders, and with the other Tribes prior to being able to provide	Comment noted. As discussed at the July 18, 2013 TWG meeting, face-to-face meetings will be held to discuss and resolve comments on the 60% design. PG&E defers decision on extension of 90% design review and FMIT's request for consultation to DOI and DTSC.	See response to comment #11a FMIT-6.	See response to comment #11a FMIT-6.	See response to comment #11a FMIT-6.	Responses noted.	Not applicable

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				comments and to allow sufficient time to exercise their rights to government-to-government consultations with the agencies in regard to project impacts. An ongoing dialogue with the Tribes during the interim period between the 60% and 90% documents would be helpful as PG&E's consultants deal with the issues raised in these comments to the 60% design. Also, the Tribes request consultation with the agencies regarding the potential impacts of the proposed final design against the design presented in the FEIR so that there is sufficient time to discuss those impacts and the sufficiency of mitigation.						
12	FMIT-7 Hualapai-7 Chemehuevi-7 Cocopah-7 CRIT-7	General		The current "project boundary" limits as depicted in various project maps have been shown to be incomplete and/or inconsistent with sensitive areas that should be avoided. This conflict needs to be resolved such that all sensitive areas are excluded from any project activity prior to completion of the 90% design document.	The project boundaries as shown in various project maps are not incomplete. With respect to avoiding sensitive areas, the design is consistent with the EIR's requirement in Mitigation Measure CUL-1a-10 to avoid "any direct physical impact on the Topock Maze, as it is manifested archaeologically." The design complies with that requirement by avoiding placement of any infrastructure in the Topock Maze as it is manifested archeologically. Additionally, in compliance with Mitigation Measure CUL-1a-10, PG&E is designing the remedy to prevent all indirect (e.g. noise, aesthetics) impacts on the Topock Maze to the maximum extent feasible as determined by DTSC.	DTSC would like to clarify that the map of the project area in the certified EIR is not meant to depict or define archaeologically sensitive areas. In compliance with the CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3), Section 15124(a), the programmatic EIR described the location and boundaries of the proposed project for evaluation and review of the potential environmental impacts associated with the proposed project. Please note that as a result of our review, DTSC adopted mitigation measures, including CUL-1a-10, to ensure project activities would avoid direct physical impact on the Topock Maze as it is manifested archaeologically.				Not applicable
13a	FMIT-8	General		Chemicals that are foreign to the natural environment are a concern to the Tribes. Additionally, some chemicals may be more offensive for use in a sacred area than others. It is necessary to fully disclose the types, volumes, and frequencies of chemical usage associated with the project. The Tribe requests consultation prior to any changes in chemical additives.	PG&E shares the Tribes' concern about chemicals and their usage in the remedy, including the sustainability perspective. At the 60% design stage, the types, volumes, and frequencies of potential chemicals anticipated for use in remedy operations are included in Section 3 and Appendix D of the 60% BOD report, as well as Volume 1 of the O&M Manual. Specifically, the O&M Manual			FMIT clarified that its reference to consultation in its original comment was to notification and discussion.	Comment resolved.	Exhibit 4.2-5 of O&M Plan (Volume 1 of the O&M Manual). Exhibit L2.2-1 of the main text of the O&M Manual.

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					Volume 1 Exhibit 4.2-5 provides a summary of potential chemicals for well rehab, and Section 7.2 lists the potential chemicals to be used in well rehab, the remedy produced water condition plant, the freshwater pre-injection treatment system, and the in-situ remediation system. Anticipated volumes of chemical usage in the remedy produced water conditioning system, the freshwater pre-injection treatment system are also provided in Appendix D (drawings G-12-02 and 12-04, respectively). PG&E requests input from Tribes during the design process as to any chemicals that may be more offensive for use in Tribes' view, as referred to in Tribes' comment, so that PG&E may consider that input now. For further clarification, the title of Exhibit 4.2-5 will be changed to: "Summary of <u>Proposed</u> ~~Available~~ Chemicals for Well Rehabilitation Applications." PG&E agrees to provide the requested notification and discuss with Tribes if requested.					
13b	Hualapai-8 Chemehuevi-8 Cocopah-8 CRIT-8	General		Chemicals that are foreign to the natural environment are a concern to the Tribes. Additionally, some chemicals may be more offensive for use in a sacred area than others. It is necessary to fully disclose the types, volumes, and frequencies of chemical usage associated with the project.	See response to comment #13a FMIT-8.				Comment resolved.	Exhibit 4.2-5 of O&M Plan (Volume 1 of the O&M Manual). Exhibit L2.2-1 of the main text of the O&M Manual.
14	FMIT-9 Hualapai-9 Chemehuevi-9 Cocopah-9 CRIT-9	General		There are very specific requirements for the handling and storage of soils displaced and/or stored during the Topock project. Therefore, any "boiler plate" General Notes related to the storage and handling of excavated materials typically included in engineering drawings and specifications are not appropriate for the Topock site. Special care should be taken during the preparation of any and all engineering plans to ensure the appropriate soil handling and storage procedures are properly described and are consistent with Topock soil handling documents.	Comment noted. As stated in response to comment #435 FMIT-127, the following wordings will be included in the General Notes: "Management of displaced soils shall be in accordance with the Soil Management Plan (Volume 4 of the O&M Manual) and the Management Protocol for the Handling and Disposition of Displaced Site Materials (Appendix B of the Soil Management Plan)."			Comment resolved.	Comment resolved.	90% BOD, Appendix D, Drawing C-00-02.

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15	MWD-1	General	Communication	A communication action plan should be developed to ensure ongoing coordination with agencies and stakeholders throughout the life of the project. Plan should identify key agency stakeholder contacts (to be updated as needed) and identify proposed notifications (i.e., monitoring, project updates, river threat notifications). In addition, the CWG communication structure, which has worked effectively, could continue to meet on a less frequent basis, such as annually. A new section should be included in the BOO report to discuss proposed communication with project stakeholders.	In compliance with requirements in the CD and the CACA, the Draft O&M Manual, Section L2.2 (page L2-1) and Exhibit L2.2-3 (pages L2-5 through L2-7) present a preliminary framework for communication, and is intended to be used by PG&E to inform, seek inputs, seek approval from agencies, resolve issues, and/or comply with requirements. Specifically, Exhibit L2.2-3 lists the types of communications, the triggering events (e.g., progress update, compliance reporting, discovery, releases, etc.), the regulations/ plans/ agreements that require such communications, the parties initiating and receiving the communications, and general communication procedures and protocols. PG&E welcomes inputs from agencies, Tribes, and stakeholders on this preliminary framework, and is open to repeating this or similar information in another section of the design report. Note that as required by the CD and CACA, this or similar info will also be included in the forthcoming Remedial Action Work Plan. PG&E defers to DTSC on the CWG communication structure and meeting frequency.	DTSC intends to continue the CWG meetings on a frequency that best serves the project stakeholders and the Tribal nations. DTSC conducts a routine meeting survey at the last scheduled CWG meeting of the calendar year to seek input and feedback on meeting frequencies, and locations. Furthermore, DTSC also welcomes feedback of meetings throughout the year and will strive to ensure that the meetings are purposeful and relevant to the project.			Comment resolved.	Exhibit L2.2-1 of the main text of the O&M Manual. Table 2.3-1 of the Construction/Remedial Action Work Plan.
Specific Comments – Executive Summary										
16	FMIT-10	Executive Summary		The Executive Summary states that a pretreatment system to polish Arizona groundwater to California standards is part of the BOD. This item was not included in the project description for the groundwater remedy as outlined in the FEIR. What will be the process for comparing the final design against the FEIR project description? How will the Tribe be included in those discussions?	PG&E defers to DTSC on FEIR content and process related the FEIR.	The January 2011 Certified EIR was prepared as a programmatic EIR with as much information known to us at the time. As the project design evolves, all concerned parties should take note of changes from the conceptual design of the remedy. DTSC will conduct a final CEQA analysis to compare the potential impacts from the existing design with the concepts evaluated in the Certified EIR. DTSC will release all findings in accordance with CEQA guidelines. DTSC, however, encourages the Tribes to present any concerns during the design evaluation				Not applicable

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						for agency consideration to be incorporated into our CEQA impacts analysis.				
17	DTSC-1	Executive Summary	The freshwater source details will be included in an addendum to the 60% BOD	Depending on timing in completion of the FWIP, PG&E may not be preparing an addendum, but instead prepare a technical memorandum of the investigation result. PG&E will incorporate the information gathered into the 90% design. Make changes to Figure ES-2 also.	Comment noted. Revision to Figure ES-2 as well as Exhibits 1.0-1/ 7.2-1 and report text will be made to reflect a technical memorandum of the FWIP investigation results as discussed at the July 17, 2013 CWG.	Okay.			Comment resolved.	90% BOD Section 3.3.1 (2nd paragraph).
18	FMIT-11	ES-1		The Overview has been revised in such a manner to highlight the modern built environment by adding references to modern intrusions into the same paragraph and context with the Maze. This is inappropriate, disrespectful and hurtful. It seems that this is an effort to try and undercut the traditional tribal use of the area. We also caution that such statements should not be used to try and question the cultural integrity of the area or the Tribe's traditional beliefs.	PG&E will include the discussion of the historic-era features and archaeological resources in a separate paragraph from the discussion of the Topock Maze.			Comment resolved.	Comment resolved.	90% BOD Section ES.1, 3rd and 4th paragraphs.
19a	FMIT-12	ES-1, etc.	The Area of Critical Environmental Concern (ACEC)	The Area of Critical Environmental Concern (ACEC) is mentioned within the 60% BOD and contributed to the exclusion of one of the potential freshwater sources, however, no map is provided within the document depicting this area. It is anticipated that the Freshwater Implementation Plan (FWIP) contains further details on this area.	The ACEC will be added to Figure 1.2-1 in Section 1 of the 90% BOD. The figure will be referenced in the text of the Executive Summary.			Comment resolved.	Comment resolved.	90% BOD Figure 1.2-1. 90% BOD Section ES.1 (5th paragraph).
19b	Hualapai-10 Chemehuevi-10 Cocopah-10 CRIT-10	ES-1, etc.	The Area of Critical Environmental Concern (ACEC)	The Area of Critical Environmental Concern (ACEC) is mentioned within the 60% BOD and contributed to the exclusion of one of the potential freshwater sources, however, no map is provided within the document depicting this area. It is anticipated that the Freshwater Implementation Plan (FWIP) is forthcoming and should provide further details on this area.	See response to comment #19a FMIT-12.			Comment resolved.	Comment resolved.	90% BOD Figure 1.2-1
20	DOI-6	Page v	"In addition, PG&E and the United States executed a Remedial Design/Remedial Action …"	Insert "on behalf of the Department of the Interior" after "Consent Decree (CD)".	Text will be inserted as requested.		Comment resolved.		Comment resolved.	90% BOD Executive Summary (1st paragraph). O&M Manual Section L1. 90% BOD Apdx B Executive Summary. 90% BOD Apdx B Section 1.1.

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21	DTSC-2	Executive Summary, Page v, Third Paragraph.	…PG&E has made the conservative assumption for freshwater pre-injection treatment goals, specifically that the arsenic treatment goal will be to reduce concentrations below the federal/state Maximum Contaminant Level (MCL) of 10 micrograms per liter (µg/L) and that the fluoride treatment goal will be concentrations below the state MCL of 2 milligrams per liter (mg/L).	DTSC and PG&E have independently concluded that although fluoride concentration from Arizona source well might be above MCL, that the receiving water body in California is similar in concentration and treatment of fluoride is presently optional and at PG&E's discretion. Therefore, designing a goal to attain 2 mg/L for fluoride is futile as higher concentrations already exist in the area where fresh water will be injected. Please revise. It is recommended that the text (here and throughout the entire document) be revised to indicate that fluoride treatment is not likely, based on existing data, due to elevated background values already above the MCL where water will be injected. Suggest supporting the issue by calculating a fluoride background number for the injection area. Show all fluoride data and calculations so that the background number and method can be verified. An arsenic background specific for the injection area should also be calculated. Clarify that arsenic treatment will be fully developed, regardless, in the 90% and final designs. If arsenic treatment is not required by the State Board now, it should be ready as a contingency should arsenic levels rise over the course of the remedy.	In response to this comment, PG&E will calculate a fluoride background concentration for the injection area, and will submit to DTSC when it is available. As for an arsenic background concentration, PG&E does not feel that this is necessary because the State Board letter allows for, under specified conditions, the injection of freshwater with naturally occurring arsenic at levels above the levels in the receiving groundwater basin. As directed by DTSC, PG&E will include a freshwater pre-injection treatment for arsenic only in the 90% and final designs as a contingency. The cited text will be revised to reflect this response throughout the 90% BOD.	Comment resolved pending review of the 90%. Include the fluoride and background in the 90%.			Comment resolved.	90% BOD Section 2.3.4. 90% BOD Section 3.3.3.4. O&M Contingency Plan (Volume 3 of the O&M Manual), Appendix B.
22	MWD-2	ES.1 /vi	At top of page "...Southern California Metropolitan Water District..."	This should read "...Metropolitan Water District of Southern California..."	Text will be revised as requested.				Comment resolved.	90% BOD Section ES.1 (1st paragraph).
23	DOI-7	Section ES.2, Page vii	Remedial Action Objectives	Information in the section should identify the expected time it will take to achieve remedial goals. Provide discussion of the modeling, as well as a short summary of operation and maintenance in this section. Key parameters, such as capture zone results and the sensitivity of TOC concentrations and injection/ extraction rates should be included. Also, include a short discussion of the SCADA system, a key operational element.	Comment noted. PG&E will include a high level summary of the projected remedial timeframe, the modeling, and elements of the operation and maintenance plan in the Executive Summary for the 90% design document. Key parameters related to operational success will be highlighted along with the role of SCADA in the operation and maintenance of the system.		Comment resolved pending review of the 90% design.		Comment resolved.	90% BOD Section ES.3, Section ES.5, and Table ES-1.

TABLE I-1
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24	DTSC-3	ES.2 Remedial Action Objectives, Page vii, Item 2	Prevent or minimize migration of total chromium (Cr[T]) and Cr(VI) in groundwater to ensure concentrations in surface water do not exceed water quality standards that support the designated beneficial uses of the Colorado River (11 µg/L Cr[VI]).	Need to add clarifying language that since river concentrations are generally not detected for chromium, remedial system operations would be modified should chromium start to be detected in the river.	Comment noted. This section of the Executive Summary is intended to merely restate the established RAOs for the reader's convenience, and not to discuss system operations/ adjustments. Please see response to a similar comment, #637 DTSC-193. No changes to text will be made.	Okay.			Comment resolved.	Not applicable
25	FMIT-13 Hualapai-11 Chemehuevi-11 Cocopah-11 CRIT-11	Executive Summary p. vii	*Ensure that the geographic location of the target remediation area does not permanently expand following completion of the remedial action.*	Shouldn't this say that the geographic "area" should not permanently expand, rather than "location"?	The reference text is accurate and consistent with the wording of RAO #4 in the CMS/FS (CH2M HILL 2009), the ROD (DOI 2011), and the Statement of Basis (DTSC 2011). The intention of this RAO is to ensure that the plume boundary (32 ug/L) does not permanently expand after completion of the remedial action.			Comment resolved.	Comment resolved.	Not applicable
26	DTSC-4	Executive Summary, page viii	central maintenance/ storage facility that will house site operation and field staff, remote control and monitoring equipment, an on-site laboratory, a document repository center, a training/conference room, equipment storage, etc.	To minimize the groundwater remedy footprint at the site, PG&E should only consider infrastructures that are critical to the operation and maintenance of the remedy. PG&E should provide specifications for minimum footprint of all required infrastructure with design basis. Allocation of space for training, conference room, library, and patio uses should not be conjoined with the remedy as required infrastructure.	Conducting meetings with stakeholders/ Tribes/ Agencies, providing trainings to project workers/ contractors, and record keeping are amongst the essential elements of the Topock remediation project and are required to comply with agencies' processes (EIR mitigation measures, ARARs, CD, CACA, etc.). The "library" is intended as a repository of essential project documents at the site for purposes of referencing, training, and record keeping. Allocation of space to ensure that these functions can be accommodated at the Topock site in the long-term is necessary. The current practice of borrowing the sole existing TCS conference room for remediation meetings/trainings is not a long-term solution, as this conference room is often needed for meetings/trainings by PG&E Gas	DTSC agrees that meetings and record keeping are essential functions of the project, however, most of these activities are currently outsourced to off-site venues. Continuation of this practice is encouraged in order to minimize infrastructures at the site. Since PG&E is now possibly proposing a change in the suggested design, DTSC will defer comments on this matter pending submission of modified infrastructure layout and design. DTSC awaits PG&E's evaluation/ proposal.			Comment resolved.	90% BOD Table ES-1 and Section 3.5.3.

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					Operations and may at times, not be available for remediation project. The “patio use” referenced in this comment, takes advantage of a natural plateau at the TWB Bench to provide additional outdoor meeting space for the project. In order to reduce the infrastructure on the Transwestern Bench, PG&E is currently evaluating the option of moving the following functions originally intended to occur at the Transwestern Bench - training, conference room, library, laboratories, maintenance, and storage – to a location at Park Moabi. The functions anticipated to remain at the bench include carbon amendment facilities, remedy wells, and a smaller building to house programmable logic controllers (PLCs), uninterrupted power supply, communications, etc. The existing equipment decon pad will still be retained for use as a decon pad. PG&E will continue to evaluate this option and will keep the agencies, Tribes, and other stakeholders informed of PG&E’s proposal prior to the 90% design submittal.					
27	DOI-8	Table ES-1 Page xi	Remedy Feature – Carbon amendment and carbon storage facilities	Please identify the anticipated initial dosage of ethanol/TOC to be delivered during system start-up.	The following text will be added as a bullet to Table ES-1 under a new section "Organic Carbon Dosing and Delivery Strategy": "<u>The system will be initiated with an anticipated initial total organic carbon amendment concentration of 100 mg/L</u>."		Comment resolved.		Comment resolved.	90% BOD Table ES-1.
28	DOI-9	Table ES-1, Page xii	Remedy Feature – Access pathways and roadways	Can a figure be used to reference the roads and pathways?	Figure 3.5-9 shows proposed access routes for remedy features. Text will be added to reference this figure in Table ES-1.		Comment resolved.		Comment resolved.	90% BOD Figures 3.5-9A and 3.5-9B.
29	MWD-3	Figure ES-1	none	Interim reviews such as the 5-year review should be included during remedy implementation for the Site Cleanup Process.	A note will be added to Figure ES-1 as requested.				Comment resolved.	90% BOD Figure ES-1 (footnote).
30	DOI-10	Figure ES-2		The figure title is misleading. Modify the title block of this figure by deleting “Initial Start-Up” <u>or</u> extend the timeline on the figure itself to include the start-up timeline.	Figure ES-2 will be modified by extending the timeline to include Initial Start-up.		Comment resolved.		Comment resolved.	90% BOD Figure ES-2.
31a	FMIT-14	Fig. ES-3 Surrounding	General Remedy	The legend in the map does not indicate what the red outlines on the	The FMIT is correct; the red outline is the EIR project area. The legend of	FMIT is correct that the red outline on the map is the			See #12 FMIT-7/Hualapai-7/ Chemehuevi-7/Cocopah-	90% BOD Figures ES-3 and ES-4A.

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		Property Map	System Layout	map represent. It is assumed that the red outline represents the project EIR boundary. It is anticipated that this boundary will be updated based on recent archeological surveys for the 90% BOD report.	this figure will be updated to explain the red line. PG&E defers to DTSC for response to project EIR boundary update.	project area based on PG&E's conceptual design at the time of the EIR in 2011. It is not DTSC's intention to conform the outline to specific archeological sites. Instead the outline is a delineation of the entire area within which project activities may or may not occur. As the project design is refined, the final project boundaries will be updated and appropriate CEQA process will be followed.			7/CRIT-7.	
31b	Hualapai-12 Chemehuevi-12 Cocopah-12 CRIT-12	Fig. ES-3 Surrounding Property Map	General Remedy System Layout	The legend in the map does not indicate what the red outlines on the map represent. It is assumed that the red outline represents the project EIR boundary. It is anticipated that this boundary will be updated based on recent archeological surveys for the 90% BOD.	See response to comment #31a FMIT-14.	See response to comment #31a FMIT-14.			See #12 FMIT-7/Hualapai-7/ Chemehuevi-7/Cocopah-7/CRIT-7	90% BOD Figures ES-3 and ES-4A.
32	FMIT-15	ES-3 and Section 2.4.1		Please explain Note 1 stating that PG&E has "a possessory interest" on two parcels (650-161-11 and 650-161-12) owned by the Havasu National Wildlife Refuge. Please provide more detail including the nature of this possessory interest and when this interest was granted, its duration and whether any consideration was paid.	PG&E's easement interest in parcels 650-161-11 and 650-161-12 was granted by the U.S. Bureau of Land Management in 1955, for the operation of a compressor station and associated pipelines. Per San Bernardino County Assessor's Office parcel map 0650-16, the total area for parcel 0650-161-12 is 25.72 acres. No acreage information is provided for parcel 0650-161-11 on the County map. Consideration was paid for the interest. The term of the easement is perpetual.			Comment resolved.	Comment resolved.	Not applicable
33	DOI-11	Figure ES-4	General Remedy System Layout	The red boundary line (EIR project boundary) is not identified in the legend but should be.	The red outline is the EIR project area; the legend of this figure will be updated to explain the red line.		Comment resolved.		Comment resolved.	90% BOD Figure ES-4A.
34	MWD-4	Figure ES-4, Figure 3.0.1		An explanation for the red line should be included in the legend.	The red outline is the EIR project area; the legend of this figure will be updated to explain the red line.				Comment resolved.	90% BOD Figure ES-4A.
35	DOI-12	Figure ES-10	60% Design Illustration	The 30% Design Illustration identified the Hazardous Waste Storage Building; however, the 60% Design Illustration does not identify any hazardous waste storage location.	PG&E currently plans to utilize a joint-use hazardous waste storage facility within the fence line of the Topock Compressor Station. The compressor station staff is conducting a project to construct a new hazardous waste storage building on site. All this information will be included in the Hazardous Material Business Plan, which will be included in the 90% design submittal.		Comment resolved.		Comment resolved.	90% BOD Figure ES-10.

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36	DTSC-5	Executive Summary	Figure ES-11	According to Appendix L, Operation and Maintenance Plan, IRZ-40 should be depicted as an IRZ extraction well, not an injection well. Please revise.	Figure ES-11 will be revised as requested (IRZ-40 is a provisional extraction well).	Okay.			Comment resolved.	90% BOD Figure ES-11.
37	FMIT-16	Figure ES-11		Figure ES-11: Please explain in narrative form (in one section) what infrastructure has been proposed to be subtracted from and added to the FMIT parcel. It would assist the Tribe's understanding of the design if a section of the 90 % BOD could describe the design in detail relative to that Parcel, the Maze and other especially culturally-sensitive locations.	Comment noted. Text will be added to the Executive Summary in the 90% BOD to describe remedy infrastructure proposed to be subtracted from 60% design and added at 90% design to the FMIT parcel. In addition, a description of the design relative to that Parcel, the Maze and other especially culturally-sensitive locations will also be provided at 90% design. Information will be provided to the FMIT for preview prior to 90% submittal.			Comment resolved.	Comment resolved.	90% BOD Section ES.3 of the 90% BOD describes remedy proposed on the FMIT parce, and changes from 60% to 90%l. Figure ES-12 illustrates the changes graphically. Tables 6.1-1 and 6.2-2 provide further information on steps taken in the design of the groundwater remedy to avoid any direct physical impact on the Topock Maze, as it is manifested archaeologically, prevent indirect impacts on the Topock Maze, to the maximum extent feasible, and avoid, minimize, or mitigate impacts on other historical and archaeological resources to the maximum extent feasible.
38	DTSC-6			Summarize/tabulate short term criteria/goals that will be the basis to assess if the remedy is operating adequately and potential contingency actions for not meeting those short term criteria/goals.	Short term goals and timeframes have implicitly been established in the Transition Plans evaluated in Section 7.3 and the Sampling and Monitoring Plan (Appendix L, Volume 2). These short term goals and a reference to the adaptive operations activities specified in the Sampling and Monitoring Plan will be summarized in the Introduction of the 90% BOD. The short-term goals summary is being developed in coordination with the agencies.	DTSC has been requesting the development of measurable short term remediation goals since the Corrective Measure Study. Although the goals stated in the response are appropriate, they lack specificity for measurement and decision making. PG&E will need to develop explicit, discrete, measurable goals/metrics in the 90%. These may be in addition to less quantifiable goals. DTSC will work with PG&E on the short term goal summary for the 90% BOD.	DOI will work with PG&E on the short term goal summary for the 90% BOD.		This topic will be carried forward. Resolution of this comment will be included in the 90% design.	PG&E is working on the short-term goals in coordination with DTSC and DOI.
39	DTSC-7			East Ravine pipeline. DTSC prefers that pipelines not be run through an active AOC that The might require characterization or remediation in the future provided that alternative access ways exist. Therefore, DTSC requests that an alternative pipeline path leading to extraction well ER-6 be selected.	PG&E is evaluating alternative pipe routing for ER-6 extraction piping, power and control conduits (see **Attachment C**, at the end of this table). It should be noted that, while any work around ER-6 will cause disturbance to the AOC, an effort will be made to minimize the amount of soil disturbed.	DTSC understands that PG&E is contemplating different approaches for the East Ravine pipeline alignment and looks forward to its presentation to agencies and stakeholders as part of the 90% design process.			PG&E and DTSC have discussed this comment and the alternative pipe routings shown in **Attachment C**, at the end of this table on December 19, 2013. As directed by DTSC, PG&E presented the alternative pipe routings to the agencies, Tribes, and stakeholders at the TWG meeting held on February 11, 2014. The ER-6 pipeline route was addressed in the letter	90% BOD Figure ES-4 and Appendix D, Drawing C-07-59.

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									received from DTSC and DOI on April 4, 2014, which provided directives on the remaining 60% issues. The agencies' directives regarding the ER-6 pipeline route will be incorporated into the 90% design.	
Specific Comments – Section 1										
40	DTSC-8	Introduction, p.1-2, 2nd paragraph, last sentence	As directed by DOI, a comment resolution meeting will be held prior to finalizing responses to comments and the Implementation Plan.	Is this correct and outstanding? DTSC assumes that this meant to say two comment resolution meetings were held in response to the comments received?	At the time of the 60% design submittal (April 5, 2013), responses to comments received on the revised FWIP (January 2013) were in progress, and one meeting had been planned to discuss responses with stakeholders, Tribes, and agencies. On May 14, 2013, the planned meeting was held. At the end of that meeting, it was decided that a second meeting was needed to complete discussions of the responses. The second meeting was held on May 21, 2013. The cited text will be deleted and replaced with: "<u>Two comment resolution meetings were held on May 14 and May 21, 2013. The Final Implementation Plan was issued on July 19, 2013 (redline version) and August 2, 2013 (clean version). Additional comments were received from one Tribe on the Final Plan. These comments were considered by DTSC and DOI prior to approving the Final Plan on September 4, 2013</u>."	Comment resolved.			Comment resolved.	90% BOD Section 3.3.1.
41	DOI-13	Section 1.1.1, Page 1-5	"Thin layers of white powdery materials …"	It should be noted that this material will be sampled as part of the ongoing Soil RFI/RI.	Comment noted. The following text will be added (shown in <u>underline</u> typeface): "Thin layers of white powdery materials have also been identified. <u>DTSC had previously sampled some of the identified white powder materials. Additional white powder material that is located on the northern slope of East Ravine below the station access road will be sampled as part of the upcoming supplemental Soil RFI/RI.</u>"		Comment resolved.		Comment resolved.	90% BOD Section 1.1.1.
42	DTSC-9	1.1.1 Description and History of SWMU 1/AOC 1 and AOC 10, Page 1-5,		Update the history to incorporate the recently discovered information regarding the 1964 waste water injection well apparently utilized for waste disposal.	Per DTSC's direction on the draft RFI/RI Volume 1 Addendum Report (Site History and Background), PG&E will provide a detailed discussion of the history of the 1964 well in that report. The following sentence will	Comment resolved.			Comment resolved.	90% BOD Section 1.1.1.

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		Paragraphs 2 and 3.			be added to this section of the 90% BOD: "A recent (2013) discovery of a 1964 site record shows a steel pipe extending from a "water treatment chamber" at the former sludge drying bed area on the TCS to an "abandoned water well" in the bottom of Bat Cave Wash, detailed information will be provided in the RFI/RI Volume 1 Addendum."					
43	DOI-14	Section 1.1, Pages 1-5 and 1-6	All paragraphs	There are numerous features cited in the text but no map for the reader to identify the locations. These features include but are not limited to: AOC 4, AOC 10, PGE-08, ACEC, the Topock Maze, and HNWR. Please include a map with the features, or cross reference to Section 2 figures as appropriate.	Features referenced in the text will be added to Figure 1.2-1, with the exception of the Topock Maze due to confidentiality reason.		Comment resolved.		Comment resolved.	90% BOD Figure 1.2-1.
44	DOI-15	Section 1.1.3, Page 1-6		The second paragraph was added in response to a DOI comment, (RTC-28, DOI 14), regarding mitigation measures developed in accordance with the BLM PA and the CHPMP. Since this section pertains to ecological resources, the recommend text in the RTCs would be more appropriate for the new Section 1.1.2. A reference to and short discussion of the PBA should be included in this section. The MMRPs address both and should be shown as such.	The second paragraph of Section 1.1.3 will be moved to the end of Section 1.1.2. The following text will be added at the end of Section 1.1.3: <u>"Remedial and investigative activities conducted to date at the Topock site are in conformance with the requirements of the 2007 Programmatic Biological Agreement (PBA) and its 2012 Addendum. Activities associated with implementation of the groundwater remedy will be under a new PBA, in conformance with the requirements of the federal Endangered Species Act (ESA), the Fish and Wildlife Coordination Act, and the Migratory Bird Treaty Act, as well as the EIR mitigation measure BIO-2b. PG&E, USFWS, and DOI are coordinating on the PBA for the final remedy. The goal is to complete the PBA in time for completion of ESA Section 7 consultation prior to the approval of the Remedial Action Work Plan."</u>		Modify the 2nd to the last sentence in the response to the following: *PG&E, USFWS,* ***BLM*** *and DOI are coordinating on the PBA for the final remedy.* BLM is currently responsible for Section 7 consultation with FWS.		The following text will be added at the end of Section 1.1.3: <u>"Remedial and investigative activities conducted to date at the Topock site are in conformance with the requirements of the 2007 Programmatic Biological Agreement (PBA) and its 2012 Addendum. Activities associated with implementation of the groundwater remedy will be under a new PBA, in conformance with the requirements of the federal Endangered Species Act (ESA), the Fish and Wildlife Coordination Act, and the Migratory Bird Treaty Act, as well as the EIR mitigation measure BIO-2b. PG&E, USFWS, BLM, and DOI are coordinating on the PBA for the final remedy. The goal is to complete the PBA in time for completion of ESA Section 7 consultation prior to the approval of the Remedial Action Work Plan."</u>	90% BOD Sections 1.1.2 and 1.1.3.
45	DOI-16	Section 1.1.3, Page 1-6		The in-text citation for BOR 2010 is not listed in the Reference section.	The in-text citation for BOR 2010 will be revised to BLM 2010.		Comment resolved.		Comment resolved.	90% BOD Section 1.1.2.
46	FMIT-17	Section 1.2		Should reference, and not downplay, the significant and unmitigated	PG&E proposes the following change in the third paragraph of Section			Comment resolved.	Comment resolved.	90% BOD Section 1.2.2.

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				impacts of the project as stated in the groundwater FEIR.	1.2.2 (inserted verbiage shown in underline typeface: "The EIR concluded that implementation of the groundwater remedy would generate significant adverse environmental impacts, and for most potential impacts, the EIR prescribes mitigation measures capable of reducing these impacts to less-than-significant levels. For impacts to cultural resources within the Topock Cultural Area and noise impacts in the Topock Cultural Area, the prescribed mitigation measures are not capable of reducing these impacts to less-than-significant, and the EIR concluded that those impacts would be significant and unavoidable. The EIR includes an MMRP (DTSC 2011c) for the groundwater remedy. The mitigation measures were identified for impacts associated with various resources, including aesthetic, air quality, cultural, biological, geology and soils, hazardous materials, hydrology and water quality, noise, and water supply resources (DTSC 2011c)."					
47	DTSC-10	Introduction, p1-8, continuation from previous page.	EIR prescribes mitigation measures capable of reducing these impacts to less-than significant levels.	Please add "where possible" after "significant levels"	The text will be added as requested.	Okay.			Comment resolved.	90% BOD Section 1.2.2.
48	DOI-17	Figure 1.2-1		Please identify the location of the Topock Maze on Figure 1.2-1, or provide further explanation in the Notes, since it is discussed in Note 2.	The Topock Maze is described in the 60% BOD, specifically the Executive Summary (page vi, 2nd paragraph) and Section 1.1.2 (page 1-6, 1st full paragraph). For confidentiality reasons, the Maze has not been identified on maps in public documents such as the 60% design. No changes will be made to Figure 1.2-1.		Comment resolved.		Comment resolved.	Not applicable
49	FMIT-18 Hualapai-13 Chemehuevi-13 Cocopah-13 CRIT-13	Fig. 1.2-1 Groundwater Remedy Project Area And System Layout	Groundwater Remedy Project Area And System Layout	It is not clear why the Cr(VI) plume boundary, which is based on Q4 2011 sampling has not been updated. The plume boundary could be refined with more recent sampling and additional data collected during the East Ravine characterization efforts	As discussed in Section 2.2 of the 60% BOD, the Cr(VI) plume boundary included data through February 2012 for the East Ravine wells. An updated Cr(VI) plume boundary will be included in the 90% BOD with additional data collected from the East Ravine groundwater investigation effort which was			Comment resolved.	Comment resolved.	Figures throughout the 90% documents. 90% BOD Section 2.2. 90% BOD Apdx B Section 6.2.5

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					completed in July 2012.					
Specific Comments – Section 2										
50	DTSC-11	Section 2 Baseline Site Conditions and Pre-Design Work		Add a section (text, tables and figures) describing baseline site conditions for the freshwater injection areas. Also see DTSC comment on Executive Summary, Page v, Third Paragraph.	A section will be added as requested in the 90% BOD.	Ok pending review of 90% report.			Comment resolved.	90% BOD Section 2.3.4.
51	DOI-18	Section 2.1.1, Page 2-1	"The Topock site is situated in a basin-and-range geologic environment in the Mohave Valley."	The Chemehuevi detachment fault should be shown in Figure 2.1-1. The text should include some discussion of the significance of the fault to the hydrogeology of the Topock site.	The surface expression of the Chemehuevi detachment fault will be shown on Figure 2.1-1. The following text will be added to Section 2.1.1, as a footnote at the end of page 2-1: "[1]The following discussion focuses on the influence of the Chemehuevi detachment fault on groundwater flow in the vicinity of the compressor station. The 2006 Bedrock Tech Memo (*Information Review of Groundwater Conditions in Bedrock Formations at PG&E's Topock Compressor Station, Needles, California. March 15, 2006*) provides additional information on the detachment fault and the influence of faults on groundwater flow in nearby basins. The footwall of the Chemehuevi detachment fault is the exposed metadiorite bedrock on the slopes south of the compressor station. In most locations near the compressor station, alluvium lies in contact with the metadiorite, so the tectonic features associated with faulting are less apparent, although distinct tectonic features are observable in some outcrops nearby and in rocks in the mountains south of the compressor station. In some locations in East Ravine and the compressor station, Miocene conglomerate overlies the metadiorite and evidence of faulting has been observed in rock cores across this contact.. Evidence of faulting within the metadiorite has not been identified in site core. The contact between the conglomerate and the metadiorite has only been encountered at depth during the installation of three wells; MW-57, MW-67, and MW-68. At MW-67 only	Comment resolved.	Comment resolved.		Comment resolved.	90% BOD Section 2.1.1. 90% BOD Figure 2.1-1.

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					7 feet of conglomerate were encountered, which may have been a boulder laying on the metadiorite rather than an intact part of the conglomerate formation. In MW-57, the conglomerate near the contact was dry when drilled but once saturated began to collapse into the hole. The conglomerate at the contact had been altered and exhibited mylonitic texture and very weak cementation. In the three wells where the contact between the conglomerate and the metadiorite was encountered. The conglomerate at the contact was completely dry. The lack of cementation in the conglomerate would tend to heal fractures that formed at the contact. Thus, the most obvious feature of the detachment fault, the contact between the conglomerate and the metadiorite does not represent a conduit for groundwater flow. Hydraulic testing from two wells that are screened across this contact also shows that it does not produce water. In MW-57, depth specific flow measurements were conducted that did not identify any flow at the contact. Depth specific flow data were not collected from MW-68BR-280, but this well is open across the contact and produces very little water. It will pump dry at a rate of 0.5 gpm. The contact was encountered in the very bottom of MW-67 but the no depth specific flow testing was done and the well is not screened across the contact. It should be noted that the fault is a zone of fracturing, not just a single break in the rock. Slickensides (evidence of rock movement along a fracture) have been observed on fracture surfaces within the metadiorite. Given the regional nature and advanced age of the detachment fault, it is likely that all the bedrock wells at the site are technically within the fault zone, so the fault itself is not an important feature in the groundwater flow at the site. The fault does not affect the chromium plume in the alluvial aquifer, all of which lies above the					

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					fault."					
52	DOI-19	Section 2.1.1, Page 2-1	"The site is located at the southern (downstream) end of the Mohave Valley groundwater basin."	The Topock Marsh should be identified in Figure 2.1-1 since it is specifically addressed in the paragraph.	The Topock Marsh will be added to Figure 2.1-1.		Comment resolved.		Comment resolved.	90% BOD Section 2.1. 90% BOD Figure 2.1-1.
53	DOI-20	Section 2.1.2, Page 2-2	"Groundwater occurs in the Tertiary and younger alluvial fan and fluvial deposits."	Please reference the appropriate figure where the wells cited in this paragraph can be located.	These wells are shown on Figure 2.2-1. In addition, these wells will be added to Figure 2.1-2. The following text will be added at the end of the 2nd sentence of 1st full paragraph: "… (see Figures 2.1-2 and 2.2-1 for well locations)."		Comment resolved.		Comment resolved.	90% BOD Section 2.1.2,
54	DOI-21	Section 2.1.2, Page 2-2	"During the test at MW-57-185 (pumped at approximately 3 gallons per minute [gpm] for 7 hours) … ."	Was steady state achieved during drawdown?	During the constant rate pumping test in MW-57-185, steady state was achieved for approximately the last two hours of the test. Please see the 2009 East Ravine report, Attachment A4-2, MW-57BR Constant Rate Test (page 387 of 1003 of the PDF file) for additional details of the drawdown in the pumping well during the test.		Comment resolved.		Comment resolved.	90% BOD Section 2.1.2,
55	DOI-22	Section 2.1.2, Page 2-2	"During the test at MW-70BR-225 (pumped at approximately 9 gallons per minute [gpm] for 12 hours) … ."	Was steady state achieved during drawdown?	During the constant rate pumping test in MW-70BR-225, steady state was achieved early in the test, and remained at steady state during the majority of the test. Please see the 2013 Addendum to the East Ravine Report Attachment D, Site H Constant Rate Test. The first graph shows the drawdown for the constant rate test performed in MW-70BR-225; page 873 of 958 of the PDF for additional details of the drawdown in the pumping well during the test.		Comment resolved.		Comment resolved.	90% BOD Section 2.1.2.
56	DOI-23	Section 2.1.2, Page 2-2	"Groundwater occurs in the Tertiary and younger alluvial fan and fluvial deposits."	Footnote 1 addresses pumping well MW-70-105, which is not one of the wells discussed in the first paragraph of Section 2.1.2 regarding performance of bedrock pump tests. Also, Footnote 1 seemingly conflicts with the statement in the first paragraph of Section 2.1.2 that yield from the bedrock wells was insufficient to cause drawdown in the higher permeability alluvium.	MW-70-105 is the water table well that is referred to in Footnote 1 (not the pumping well). The footnote will be edited to clarify this. In addition, well MW-70-105 is a shallow bedrock well, not installed in the alluvium.		Comment resolved.		Comment resolved.	90% BOD Section 2.1.2.
57	DOI-24	Section 2.1.2, Page 2-3	"… fractured bedrock is in hydraulic	Are upward gradient conditions consistently present at the site? Do seasonal fluctuations of groundwater	Available data shows that upward gradients are dominant but sufficient data are not available for all seasons		Comment resolved.		Comment resolved.	Not applicable

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			communication with the Alluvial Aquifer and equilibrates to an approximate elevation similar to the water table in the Alluvial Aquifer."	elevations ever present a downward gradient condition?	and all wells to determine whether seasonal fluctuations may sometimes result in a reversal of gradients in some locations.					
58	DTSC-12	2.2 Chromium Plume Dimensions, First Quarter 2012, P.2-3		Minor Edits: Table 2.2-1 footnotes are not numbered properly and do not correlate with the Notes section under the table. Table 2.2-2 should indicate why the maximum concentration for mercury is "0".	The footnotes in Table 2.2-1 will be corrected, and the numbered notes will be numbered accordingly to include information for the following table items: 1. Results Summary for RFI/RI Wells. 2. Background Comparison 3. Chemical-Specific ARARs 4. Number of Wells with Average Exceeding UTL. The maximum concentration for mercury is 0.4 µg/L. This table will be updated in the 90% BOD.	Comment resolved pending review of the 90% BOD.			Comment resolved.	90% BOD Tables 2.2-1 and 2.2-1.
59	DTSC-13	2.2 Chromium Plume Dimensions, First Quarter 2012, P.2-4	The volume of the plume within the East Ravine bedrock formation is believed to represent less than 2 percent of the total plume.	Calculations supporting the 2 percent value should be included in the document. If this calculation is located elsewhere in the design document, please reference.	This estimate derives from the groundwater transport model. The model is initialized with the February 2012 chromium plume. The porosity values in the model are as follows: a) alluvial aquifer porosity is 12% mobile and 23% immobile; b) bedrock aquifer porosity is 2% mobile and 0.1% immobile. Assuming these porosity values with equal concentrations in mobile and immobile phases, the volume of the chromium plume in bedrock is less than 1% of the total. The figure of <2% was used to account for the uncertainty in the bedrock porosity value. The above explanation will be added to the 90% BOD.	Comment resolved pending review of the 90% BOD.			Comment resolved.	90% BOD Section 2.2.
60	DTSC-14	2.3.1 Constituents of Potential Concern (COPCs), P.2-4	It should be noted that the COPCs (selenium, molybdenum, and nitrate) are not expected to impact remedy performance	The statement is a little confusing. The remedy design must account for monitoring of these parameters. Action levels or goals should be developed to ensure elevated concentrations do not adversely affect the environment or the remedy (e.g., reduce nitrate to below MCL; contain elevated COPCs within the	For consistency with response to comment #61 DTSC-15, the first sentence of the cited text will be revised to: "It should be noted that the COPCs (selenium, molybdenum, and nitrate) are not expected to ~~impact remedy performance and, therefore, do not~~	DTSC conceptually agrees that the COPCs should not have significant effects of the performance of the in-situ remedy. However, PG&E should develop, as part of O&M, action levels and procedures for dealing with the COPCs in the unlikely event			Comment resolved.	90% BOD Section 2.3.1. O&M Manual Volume 2 Section 5.1.2.

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			and, therefore, do not impact the remedy design. Further, the 2009 Groundwater Risk Assessment (ARCADIS 2009) concluded that selenium, molybdenum, and nitrate do not represent a significant health risk to future hypothetical users of the groundwater.	boundary of the chromium plume). PG&E has indicated that the remedy should only help to reduce the concentrations of these particular constituents. Modification of the sentence is required. The 2009 risk assessment is not up to date with current data, especially new data collected at the TCS and East Ravine. For instance, new nitrate data collected were higher than that utilized in the 2009 risk assessment. Therefore, modifying risk assessment conclusions is requested.	~~impact the remedy design~~ have any significant effect on the performance of the in-situ reduction. However, the COPCs will be monitored throughout the remedy. Remedy pumping and injection will be operated so that the extent of elevated concentrations of COPCs at the completion of the remedy does not extend beyond the current extent of the chromium plume. The COPCs can be removed from groundwater within the IRZs. During operation, the areas of elevated COPCs are not expected to expand beyond the current boundaries of chromium plume or the floodplain down gradient from the IRZ. COPC concentration trends in wells on either side of the IRZ will be monitored to evaluate the degree to which COPCs are being attenuated by the IRZ." Threshold concentrations and a decision tree for assessment of elevated COPCs will be included in the 90% design. As agreed in the Human Health and Ecological Risk Assessment Work Plan Addendum 2 memorandum (RAWP Addendum 2 – Scope; ARCADIS 2013), an outline of the approach to evaluate the new groundwater data collected since the 2009 Groundwater Risk Assessment (GWRA; ARCADIS 2010) will be presented in the upcoming RAWP Addendum 2, and the results of the evaluation presented either as a technical memorandum or an addendum to the GWRA. Note, however, that the new groundwater data collected in the TCS and East Ravine have been evaluated and the results of the evaluations presented in the "Addendum to the Summary and Findings Associated with the East Ravine Groundwater Investigation" dated November 15, 2012 (CH2MHILL 2012). As stated in the November 2012 document, the new data do not suggest any previously unknown hotspots or contaminant source areas.	that the COPCs are more prominent than expected. Comment resolved pending review of the 90% design.				

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61	DTSC-15	2.3.1.1 Selenium, P. 2-4	Selenium is not expected to impact remedy performance and therefore does not impact remedy design.	Please delete the cited sentence as it is redundant and not entirely accurate. Also delete the equivalent sentences in the molybdenum and nitrate sections.	This sentence and equivalent sentences about molybdenum and nitrate will be revised as follows (inserted verbiage shown in <u>underline</u> typeface, deleted verbiage shown in ~~strikethrough~~ typeface): "~~[COPC name] is not expected to impact remedy performance and therefore does not impact remedy design.~~ <u>[COPC name] will be monitored throughout the remedy. It is not expected to have any significant effect on the performance of the in-situ reduction, however remedy pumping and injection will need to be operated so that the extent of elevated concentrations of [COPC name] at the completion of the remedy does not extend beyond the current extent of the chromium plume.</u>" See also discussion about selenium and nitrate in the response to comment #62a FMIT-19.	Comment resolved.			Comment resolved.	90% BOD Section 2.3.1.
62a	FMIT-19	Section 2.3.1p. 2-4	*It should be noted that the COPCs (selenium, molybdenum, and nitrate) are not expected to impact remedy performance and, therefore, do not impact the remedy design.*	Elevated concentrations of nitrate in groundwater were caused by repeated evaporation of naturally occurring nitrate (see PG&E Technical and Ecological Services, Bat Cave Wash, 1995; and RFI-RI, Volume 2, 2008). Elevated selenium concentrations in water from wells in the study area appear to correlate with nitrate concentrations (See Exhibit VI); therefore, it might be that selenium concentrations are a reaction product of the high nitrate concentrations (possibly the solid-phase selenium in aquifer sediments is being oxidized by nitrate). Carbon amendments to the aquifer will treat and remove both nitrate and selenium; however, as the nitrate plume is hydraulically pushed into the IRZ line, nitrate will inhibit the reduction of chromate? Can the model be used to forecast arrival of the nitrate plume and reactions at the IRZ line?	The agency approved Final RFI/RI Volume 2 Report discusses several potential sources of nitrate in site groundwater besides the evaporative concentration in original blowdown water. Section 5.3.1.6 on page 5-19 of the RFI/RI Volume 2 states: "The nitrate in these wells may be associated with mountain front recharge, as the wells lay at the base of an alluvial fan within or near incised drainage channels running northward. Numerous studies have documented nitrate generation through lightning discharges in thunderstorms.. Recent research has shown that a significant reservoir of nitrate can accumulate in the soil beneath areas of desert pavement in the Mohave Desert (Graham, 2008 [*Large near-surface nitrate pools in soils capped by desert pavement in the Mojave Desert*. California Geology. Volume 36, No. 3. R.C. Graham, et al.])… Another potential source of nitrate is historical blasting associated with railroad, freeway, compressor station, and pipeline construction, and with the quarry behind the Old Evaporation Ponds. Other potential nitrate sources include animal grazing, which historically took place on portions of			Comment resolved.	Comment resolved.	O&M Manual Volume 2 Section 4.2.1. O&M Manual Volume 2 Table 2.1-2.

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					the site, and evaporative concentration of natural nitrate in blowdown water at the facility." It is possible that nitrate (and other oxyanions) may compete with the reduction of chromate by organic carbon. However, compared to the mass of chromate in the plume, the mass of nitrate is relatively small. Therefore, PG&E will closely monitor the concentrations and movement of nitrate and other nitrogen compounds (nitrite and ammonium), and operate the remediation system as efficiently as possible, and to anticipate and prepare for the effects of competing oxyanions on the efficacy of carbon amendments. Monitoring of nitrate has been included in Table 2.1-2 of the Draft O&M Manual, Volume 2 (Sampling and Monitoring Plan). This table will be revised in the 90% BOD to include monitoring of other nitrogen compounds.					
62b	Hualapai-14 Chemehuevi-14 Cocopah-14 CRIT-14	Section 2.3.1p. 2-4	*It should be noted that the COPCs (selenium, molybdenum, and nitrate) are not expected to impact remedy performance and, therefore, do not impact the remedy design.*	Elevated concentrations of nitrate in groundwater were caused by repeated evaporation of naturally occurring nitrate (see PG&E Technical and Ecological Services, Bat Cave Wash, 1995; and RFI-RI, Volume 2, 2008). Elevated selenium concentrations in water from wells in the study area appear to correlate with nitrate concentrations (See Exhibit V; R2=0.78); therefore, it might be that selenium concentrations are a reaction product of the high nitrate concentrations (possibly the solid-phase selenium in aquifer sediments is being oxidized by nitrate). Carbon amendments to the aquifer will treat and remove both nitrate and selenium; however, as the nitrate plume is hydraulically pushed into the IRZ line, is it possible that nitrate will inhibit the reduction of chromate? Can the model be used to forecast arrival of the nitrate plume and reactions at the IRZ line?	See response to comment #62a FMIT-19. Also note response to comment #61 DTSC-15.			Comment resolved.	Comment resolved.	O&M Manual Volume 2 Section 4.2.1. O&M Manual Volume 2 Table 2.1-2.
63	DTSC-16	2.3.1.3 Nitrate, P. 2-5	Concentrations elevated above the UTL and in some cases above the	Revise the sentence as follows, "Concentrations elevated above the UTL and in some cases above the ARAR of 10 mg/L are found in the alluvial zone of the aquifer ~~along the~~	PG&E disagrees with the proposed text changes. Inspection of the historical nitrate data in the agency approved RFI/RI Volume 2 Addendum (Figure 2-16, page 66 of	Comment resolved. See response to comment #65 DTSC-18.			Comment resolved.	Not applicable

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			ARAR of 10 mg/L are found in the alluvial zone of the aquifer along the mountain front recharge areas (i.e., southern Bat Cave Wash and the New Evaporation Ponds).	~~mountain front recharge areas (i.e., southern Bat Cave Wash and the New Evaporation Ponds).~~ almost exclusively within the boundary of the chromium plume."	the report PDF) demonstrate that the locations in the New Ponds area are consistently high and not insignificant in number compared to the locations found within the plume. In addition, the majority of plume monitoring locations have low concentrations of nitrate, without counting the naturally-reducing portions of the floodplain. No changes are proposed to the text.					
64	DTSC-17	2.3.1.3 Nitrate, P.2-5	…there are several potential sources of nitrate, including concentration by lightning in rainfall, disruption of desert pavement, blasting materials from nearby quarries and roadway construction, animal grazing, and evaporative concentration in industrial wastewater.	The discussion on nitrate contamination does not mention a potential source on the station: waste releases from various septic systems. Please revise text to acknowledge this issue.	The following sentence is proposed to be added at the end of the cited sentence: "<u>The septic systems at the Topock Compressor Station may be a potential source of nitrate.</u>"	Comment resolved.			Comment resolved.	90% BOD Section 2.3.1.
65	DTSC-18	2.3.1.3 Nitrate, P.2-5	Although multiple potential sources exist for elevated nitrate in groundwater, DTSC maintains it cannot be eliminated as a COPC.	Revise the sentence as follows, "Although multiple potential sources exist for elevated nitrate in groundwater, DTSC maintains it cannot be eliminated as a COPC<u>, especially in light of recent elevated nitrate data that clusters near the compressor station suggesting it as a source.</u>	Elevated nitrate near the Compressor Station have been known for some time (see Figure 2-16 of RFI/RI Volume 2 Addendum). It was agreed at that time that Compressor Station sources were a potential source, among the others described. PG&E suggests the additional text be revised to read "…, <u>given the highest nitrate concentrations occur in groundwater wells near the Compressor Station.</u>"	Comment resolved.			Comment resolved.	90% BOD Section 2.3.1.
66	DTSC-19	2.3.3.1 Total Dissolved Solids, P.2-8	The greater TDS in these wells is not believed to be due to their association with the plume	Please delete the cited sentence because the cited wells would have obviously been affected by TDS releases associated with PG&E's discharges to Bat Cave Wash.	The following text will be added following the cited text: ""….10,000 mg/L. <u>Because well MW-9, MW-10, and MW-11 are chromium contaminated wells, the TDS associated with them cannot be attributed to only natural TDS, but</u>	Comment resolved.			Comment resolved.	90% BOD Section 2.3.3

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			footprint, since historical samples collected outside the RFI/RI from the Old Evaporation Ponds wells ranged between 500 and 10,000 mg/L.		must represent a mixture including TDS associated with waste discharge from the compressor station."					
67	DTSC-20	2.3.3.1 Total Dissolved Solids, P.2-9 && 2.3.3.2 Sulfate, P.2-9	TDS is not expected to impact remedy performance nor impact the remedy design. In particular, Cr(VI) reduction was observed in the presence of elevated TDS concentrations, as presented at the January 19, 2012 TWG meeting. Additional discussions are included in Appendix B (Groundwater Modeling) of this BOD Report. Similar to TDS and the COPCs (selenium, molybdenum, and nitrate), sulfate is not expected to impact remedy performance nor impact the design.	Please delete the cited paragraph/sentence as they are redundant with language on page 2-8, section 2.3.3. See DTSC comments on 2.3.1 Constituents of Potential Concern (COPCs), P.2-4 and 2.3.1.1 Selenium, P.2-4 above. What are the TDS limits for injection? Waste discharge limits issued from the Regional Water Quality Control Board for IM-3 were specified and PG&E complied with them. It seems there should be some general minerals limit for waters injected into the aquifer that are not eventually captured by the proposed remedy. Start with IM3 WDR limits and discuss rationale for any excursions from those limits. Need to establish discharge limits for large suite of parameters: Title 22 metals, general minerals, etc.,	The cited sentences will be removed in the 90% BOD. It is unclear as to how the second part of this comment is related to these sections of the BOD, which are intended to describe the baseline conditions for TDS and sulfate. Nonetheless, as discussed in the response to comment #145 DTSC-50, PG&E believes that TDS limits for injection is not required for the remedy. It is important to note that the purpose for injection with respect to the remedy is different from the purpose of discharge with respect to IM3. The selected remedy relies on the ability to inject water in order to mix water throughout the treatment zone, therefore, setting discharge limits is inconsistent with the selected remedy. The purpose of IM3 discharge is a sustainable way to retain water in the groundwater basin and to minimize the amount of trucking needed for off-site disposal. Setting discharge limits for IM3 is appropriate to ensure the quality of water being returning to the basin.	Ok DTSC agrees that discharge limits should not be described in the referenced section of the design report. However, DTSC disagrees with PG&E that discharge limits are not warranted for the remedy because the purpose of remedy is different from IM3. Although the reasons for water injection might be different, the goal of both actions is to ensure the quality of the water returning to the basin and to ensure that the beneficial use designation of the basin plan is maintained outside of the plume area. DTSC disagrees that setting discharge limits are inconsistent with the selected remedy. Also see response to comment #145.			Discussion between DTSC, DOI, RWQCB, and PG&E is ongoing to resolve this comment. This topic will be carried forward. Resolution of this comment will be included in the 90% design. PG&E will also work on items related to this comment as directed in the Agencies' direction letter dated April 4, 2014.	90% BOD Section 2.3.3.
68	DOI-25	Section 2.4.1, Page 2-10	"Kinder Morgan, the co-owner (along with PG&E) of the arched bridge	There are no recommendations to address the brace members because Appendix G, Section 7 (Recommendations) is missing. Please provide Section 7.	See Drawing #481620, Change #1 (Erection Plan, Colorado River Highway Bridge Topock-Milpitas Main 300) for recommended modifications for compliance with current wind/horizontal loading		Comment resolved.		Comment resolved.	90% BOD Appendix G.

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			over the Colorado River, … ."		requirements (included in **Attachment K**, at the end of this table). This drawing will be added to the report as Section 7. PG&E Gas Transmission, as the entity responsible for the pipe bridge within PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the arched bridge. Any follow-on pipeline bridge improvement project will be a Gas Transmission project. Consistent with current practice, PG&E will keep the agencies, stakeholders, and Tribes informed of Gas Transmission projects in the Topock area.					
69	DTSC-21	Section 2.4.1, 1st bullet, p. 2-11	To maximize reuse of the existing electrical infrastructure, the final groundwater remedy will use power from the Compressor Station and/or the City of Needles Electric system.	Please note as a condition for the approval of the selected remedy, DTSC required, in the January 31, 2011 remedy approval letter, that " (2) PG&E shall rent or otherwise obtain a single new primary 320 kW generator, of similar make and model of the existing generator (Isuzu Model 6WG1X), for purposes of providing backup electricity when needed at the site for implementation of the approved project."	Comment noted. PG&E will obtain a generator that meets the condition of approval in DTSC's January 31, 2011 remedy approval letter. The generator will be located on PG&E parcel.	Resolved. DTSC will review the complete electrical system as part of the 90% design.			Comment resolved.	90% BOD Sections 2.4.1 and 3.5.1. O&M Manual Volume 1 Section 2.4.
70	FMIT-20	Section 2.4.1		References that an inventory of existing infrastructure related to the project area is ongoing. The Tribe looks forward to seeing this inventory. A schedule for publishing this inventory should be provided.	A draft of the inventory will be available at 90% design.			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Section 2.4.1 and Figure 2.4-1A.
71	MWD-5	2.4.1/ 2-9	First paragraph, fourth sentence "...Southern California Metropolitan Water District."	This should read "...Metropolitan Water District of Southern California."	Text will be revised as requested.				Comment resolved.	90% BOD Section 2.4.1.
72a	FMIT-21	Section 2.4.3.1, p. 2-12 Coordination of RFI/RI Soil Investigation with Remedy Design and Construction	*As discussed during the resolution of comments on the 30% BOD (PG&E 2011a), the additional soil investigations will incorporate*	It is not clear why a discussion regarding an infiltration gallery is included within the 60% BOD. The Tribe is opposed to this option.	Management of remedy wastewater including transport, treatment potential and disposal/reuse was first discussed in Section 2.2.3 of the November 2011 CMI/RD Work Plan, and again in Section 3.4 of the 30% BOD. In each report, the rationale for an infiltration gallery in Bat Cave Wash was presented (e.g., Item #5 on page 2-25 of the CMI/RD, 1st		Revise the last sentence of the first paragraph as follows: there **were** no other comments from Tribes on this subject. Also include a note in the response that the infiltration gallery was included as an	Tribe considers this issue open pending future proposal by PG&E.	PG&E's revised response is as follows: Management of remedy wastewater including transport, treatment potential and disposal/reuse was first discussed in Section 2.2.3 of the November 2011 CMI/RD Work Plan, and again in Section 3.4 of the 30% BOD. In	90% BOD Exhibit 3.4-2 (see note at end of Exhibit).

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			the possible use of an infiltration gallery in Bat Cave Wash for disposal of treated remedy produced water, and will include collection of relevant and adequate data to support the CMS/FS design.		paragraph of Section 3.4.2 on page 3-27 of the 30% BOD). While there was a comment from one Tribe in favor of surface water infiltration in Bat Cave Wash, there was no other comments from Tribes on this subject. The Tribe's concern is however, noted. This option is not being further evaluated at this time. If PG&E proposes to evaluate this option further in the future, PG&E will discuss the option and the Tribe's concern at that time.		alternative for wastewater disposal in the EIR and that further input from the Tribes will be considered during the soil CMS/FS development and review.		each report, the rationale for an infiltration gallery in Bat Cave Wash was presented (e.g., Item #5 on page 2-25 of the CMI/RD, 1st paragraph of Section 3.4.2 on page 3-27 of the 30% BOD). While there was a comment from one Tribe in favor of surface water infiltration in Bat Cave Wash, there were no other comments from Tribes on this subject. The EIR considered both onsite management and off-site disposal of remedy-produced water - the infiltration gallery was one of the potential onsite management options. The Tribe's concern is however, noted. This option is not being further evaluated at this time. If PG&E proposes to evaluate this option further in the future, PG&E will discuss the option and the Tribe's concern at that time, and will seek further input from the Tribe during the Soil CMS/FS development and review.	
72b	Hualapai-15 Chemehuevi-15 Cocopah-15 CRIT-15	Section 2.4.3.1, p. 2-12 Coordination of RFI/RI Soil Investigation with Remedy Design and Construction	*As discussed during the resolution of comments on the 30% BOD (PG&E 2011a), the additional soil investigations will incorporate the possible use of an infiltration gallery in Bat Cave Wash for disposal of treated remedy produced water, and will include collection of relevant and adequate data to support the CMS/FS design.*	It is not clear why a discussion regarding an infiltration gallery is included within the 60% BOD. The Tribes are opposed to this option.	See response to comment #72a FMIT-21.			Tribes consider this issue open pending future proposal by PG&E.	See above.	90% BOD Exhibit 3.4-2 (see note at end of Exhibit).

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73	DTSC-22	2.4.4 Surface Water and Wetlands, Page 2-13, Table 2.4-1	Table 2.4-1 and Starting with the annual event in December 2010, in-situ byproducts (arsenic, manganese, and iron) were added to the list of analytes for the surface water monitoring program to assist with establishing baseline levels upgradient and downgradient of the site.	Surface water monitoring should include, at a minimum, monitoring for COPCs nitrate, selenium, and molybdenum. Table 2.4-1 indicates that minimal data has been collected for nitrate, selenium, and molybdenum to date and, therefore, collection for these constituents should be implemented immediately. Appropriate detection limits are not being used for selenium according to the table (detection limits are greater than chemical specific ARAR levels). This should be rectified during future sampling events.	The three COPCs (selenium, molybdenum, and nitrate) were added to the Topock surface water monitoring program in June 2011. Table 2.4-1 of the 60% BOD includes data through December 2011. As of September 2013, the number of surface water samples collected for selenium is 288, for molybdenum is 288, and for nitrate is 276. The detection limit for selenium in surface water samples has been reduced from 10 to 5 parts per billion since August 2012. Table 2.4-1 will be updated in the 90% BOD.	Comment resolved.			Comment resolved.	90% BOD Table 2.4-1.
74	DTSC-23	Section 2.4.4, p. 2-13, 3rd paragraph	Starting with the annual event in December 2010, in-situ byproducts (arsenic, manganese, and iron) were added to the list of analytes for the surface water monitoring program to assist with establishing baseline levels upgradient and downgradient of the site.	In the 60% design, Section 2.3.2, PG&E also identified iron and barium as potential by-product of remedy. PG&E should immediately incorporate these constituents into the sampling program for baseline purposes as well.	As indicated in the 60% BOD, iron was added (along with arsenic and manganese) to the Topock surface water monitoring program in December 2010. Barium will be added to the surface water monitoring program starting with the next surface water sampling event in November 2013.	Comment resolved.			Comment resolved. Note that Barium was added to the surface water monitoring program in November 2013.	90% BOD Section 2.4.5 and Table 2.4-1.

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75	DOI-26	Section 2.4.6, Page 2-14		In-text citations for 2008 California Diversity Database (CNDDB) and 2010 CNPS are inconsistent. A consistent format should be used.	The in-text citations for the subject references are consistent with the citation convention in the 60% BOD, and that is to spell out the exact wording of an abbreviation the first time it appears in the report. Thus, in the last paragraph of Section 2.4.6 (page 2-14), CNDDB is spelled out because this is the first time this abbreviation appears in the report; whereas CNPS is not spelled out because this is its second appearance in the report (the first appearance is in the 4th bullet of Section 2.4.6 where its exact wording is spelled out, consistent with the convention).		Comment resolved.		Comment resolved.	Not applicable.
76	DOI-27	Section 2.4.6, Page 2-16	Special-Status Plants	In-text citations for USFWS (1996a) and CNPS (2001) are inconsistent. A consistent format should be used.	The in-text citations for the subject references are consistent with the citation convention in the 60% BOD, and that is, for authors of multiple publications in a single calendar year (e.g., USFWS in 1996), to assign a letter after the year in alphabetical order. When there is only one publication in a single year, no letter is needed after the year (e.g., CNPS in 2001).		Comment resolved.		Comment resolved.	Not applicable.
77s	DOI-28	Section 2.4.7, Page 2-17	"The EIR mitigation measure CUL-1b/c2 requires that a cultural resources study be conducted …."	It is stated that a geoarchaeological investigation was completed in June 2012, and that a report is forthcoming. It is unclear if information contained within the report will influence the design. If so, it is important to have this report available and an analysis complete before final direction is given on changes to the 60% Design.	PG&E provided a draft geoarchaeological investigation report to Tribes for review in July 2013, and recently discussed with Tribes at the August 20, 2013 TMU meeting. The investigation results inform the design. Although the report is not due to agencies until the 90% design, in response to this comment, PG&E will provide a draft report to DOI for its preview.		Comment resolved.		Comment resolved.	Not applicable.
78	DOI-29	Table 2.2-1	Notes	The in-text citation for CH2M HILL 2009 is not listed in the Reference section.	The letter "a" will be added after 2009.		Comment resolved.		Comment resolved.	90% BOD Table 2.2-1.
79	DOI-30	Table 2.3-1	Notes	The in-text citation for CH2M HILL 2008 is not listed in the Reference section.	The information for CH2M HILL 2008 is in the References section; please see the 5th reference listed under CH2M HILL.		Comment resolved.		Comment resolved.	90% BOD Table 2.3-1.
80	DOI-31	Figure 2.1-2		Please modify the legend to identify and define two map features – the black dashed line and the gray dotted line.	The gray dotted line demarcates the Bat Cave Wash channel. The black dashed line is an approximation of the extent of saturated alluvium. The legend will be modified to include both map features.		Comment resolved.		Comment resolved.	90% BOD Section 2.1 and Figure 2.1-1.

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81	DOI-32	Figure 2.4-3	Notes	The in-text citation for CH2M HILL 2009 is not listed in the Reference section.	The 2009 East Ravine Investigation Report is Appendix A to the CMS/FS (CH2M HILL 2009d), which is listed in the Reference section. The letter “d” will be added after 2009 on Figure 2.4-3.		Comment resolved.		Comment resolved.	90% BOD Figure 2.4-3. The letter “e” instead of “d” was added after 2009 to reflect updated reference section in the 90% BOD.
82	DOI-33	Figure 2.4-4		The font in the legend and figure are very small and difficult to read. At the minimum, it would be helpful to show a larger label and arrow identifying the locations of AOCs 11 and 12 since they are called out in the text (first paragraph of Section 2.4.3).	Figure 2.4-4 will be revised to show larger labels and arrows.		Comment resolved.		Comment resolved.	90% BOD Figure 2.4-4.
83	DOI-34	Figure 2.4-11		Indigenous plants of traditional cultural significance within the EIR project area in compliance with mitigation measure CUL-1a-5: Arrowweed is not included on the map but should be as it has been identified as a plant of cultural significance.	Culturally significant plants shown in Figure 2.4-11 included only those species that were included in Appendix PLA of the Final EIR. The list in Appendix PLA is based on a list of Colorado River Indian Ethnobotany. Arrow weed is not included on that list. Arrow weed however will be protected during construction as a mature plant under AES-1a. Populations of arrow weed were mapped in the Mature Plants Survey Report included in Appendix A7 of the 60% BOD (see Figure 3, page 509 of the PDF).		Add a footnote to Figure 2.4-11 noting that the Tribes have stated that Arrow weed is an ethnobotanical sensitive plant (June 2011).		The following note will be added to Figure 2.4-9 in the 90% BOD: “Tribes have stated that Arrow weed is an ethnobotanical sensitive plant (June 2011). Arrow weed however is not on the Appendix PLA of the FEIR. Arrow weed will be protected during construction as a mature plant under AES-1a.”	90% BOD Sections 2.4.6 and 2.4.7, and Figrue 2.4-11.
84a	FMIT-22	Figure 2.4-11 Indigenous Plants Of Traditional Cultural Significance Within The EIR Project Area In Compliance With Mitigation Measure Cul-1a-5	Note on map reads: *“Note that in compliance with EIR mitigation measure CUL-1a-9 as well as PA and CHPMP mitigation measures, the pipeline along the dirt road west of National Trails Highway is located in an existing, previously disturbed, access road. In addition, the location of the road and the pipeline was field verified and does not*	The statement that “the location of the road and the pipeline does not create any direct effect on the Topock Maze,“ which is made based on alleged compliance with EIR mitigation measure CUL-1a-10, PA and CHPMP should be removed from the text. It is overstated and misleading. Compliance with these measures does not ensure that the cultural and spiritual integrity of the site is unaffected. It should be emphasized that the Tribe was not sufficiently made part of the groundwater EIR process. Tribes have the singular capacity to evaluate whether there are impacts on the Maze. Additionally, some of the recent archaeological surveys performed by the Tribes in cooperation with PG&E and DTSC contractors indicate there may indeed be direct effects on the Maze. Would it be possible to place all of the infrastructure on the east side of National Trails Highway to	PG&E understands and the EIR acknowledges that the mitigation measures do not ensure the spiritual integrity of the site is unaffected. The note does not state that compliance with mitigation measures would ensure that the cultural and spiritual integrity of the site is unaffected. As disclosed in the EIR, even with implementation of CUL-1a-9 and CUL-1a-10, the impact on the Topock Cultural Area as a historic resource would be significant and unavoidable. (Final EIR at p. 4.4-61.) As the note on Figure 2.4-11 states, however, compliance with the requirements of the PA, CHPMP mitigation measures, and EIR mitigation measures CUL-1a-9 and CUL-1a-10 will prevent direct impacts on the Topock Maze as archeologically manifested. Through discussions with the Tribe, PG&E understands that the Tribe’s comment that the “Tribe was not sufficiently made part of the EIR				PG&E’s response was discussed with the FMIT, and revised in response to that discussion. In addition, PG&E evaluated moving all NTH IRZ wells to the east side of National Trails Highway and the results of the evaluation was presented at the February 11, 2014 TWG meeting (map is included in **Attachment D**, at the end of this table). PG&E understand that this comment is resolved.	Several figures in the 90% BOD show all NTH IRZ wells on the east side of National Trails Highway (e.g., Figures ES-4A, ES-10, etc.)

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			create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10 and PA and CHPMP mitigation measures."	better avoid cultural resources that may be eroding from the mesas?	process" does not refer to the overall EIR process, but is specific to the initial archeological surveys of the Maze. In addition, PG&E understands that the comment is not intended to be a claim against the EIR process. PG&E notes for the record that DTSC provided all stakeholders with the opportunity to comment on the Draft and Final EIR pursuant to CEQA, and made a special effort to consult with the Tribe. The Tribe availed itself of those opportunities, submitting numerous comments. (See, e.g., Final EIR, Vol. 1, at pp. 4-2-112, 4-170-78.) The Final EIR responds to the Tribe's comments and numerous changes to the EIR were made based on the Tribe's input. (*Id.* at pp. 4-113-69, 4-179-84.) See response to comment #12 FMIT-7. PG&E is committed to complying with the state and federal mitigation measures to ensure that the Project will not have a direct impact on the Maze as it is archeologically manifested. PG&E understands that the Tribes have conducted a Tribal Cultural Values Assessment, which is currently under review by the agencies and PG&E. The issue of the Maze boundaries and the Project's compliance with applicable state and federal mitigation measures will thus be a subject of further discussion between PG&E, the Tribes, and the agencies. In response to the question about the possibility of placing the infrastructure on the east side (instead of the west side of NTH), and based on the comment clarification discussion with the Tribes on 9/5/13 and subsequent discussions at the December 2013 TWG meeting, PG&E reviewed the locations of all provisional IRZ wells below the mesas and determined that these provisional wells could be moved to the east side of NTH. Specifically, the proposed new locations for four provisional wells (IRZ-12, IRZ-14, IRZ-22, and IRZ-24) were included on a map that was made available to stakeholders,					

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					Tribes, and the agency representatives who participated in the October 28, 2013 site walk (map is included in **Attachment D**, at the end of this table).					
84b	Hualapai-16 Chemehuevi-16 Cocopah-16 CRIT-16	Figure 2.4-11 Indigenous Plants Of Traditional Cultural Significance Within The EIR Project Area In Compliance With Mitigation Measure Cul-1a-5	Note on map reads: *"Note that in compliance with EIR mitigation measure CUL-1a-9 as well as PA and CHPMP mitigation measures, the pipeline along the dirt road west of National Trails Highway is located in an existing, previously disturbed, access road. In addition, the location of the road and the pipeline was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10 and PA and CHPMP mitigation measures."*	The statement that "the location of the road and the pipeline does not create any direct effect on the Topock Maze", which is made based on alleged compliance with EIR mitigation measure CUL-1a-10, PA and CHPMP, should be removed from the text. This statement is overstated and misleading. Compliance with these measures does not ensure that the cultural and spiritual integrity of the site is unaffected. It should be emphasized that the Tribes were not sufficiently made part of the groundwater EIR process. The Tribes have the singular capacity to evaluate whether there are impacts on the Maze. Additionally, some of the recent archaeological surveys performed by the Tribes in cooperation with PG&E and DTSC contractors indicate information to the contrary. Would it be possible to place all of the infrastructure on the east side of National Trails Highway?	PG&E understands and the EIR acknowledges that the mitigation measures do not ensure the spiritual integrity of the site is unaffected. The note does not state that compliance with mitigation measures would ensure that the cultural and spiritual integrity of the site is unaffected. As disclosed in the EIR, even with implementation of CUL-1a-9 and CUL-1a-10, the impact on the Topock Cultural Area as a historic resource would be significant and unavoidable. (Final EIR at p. 4.4-61.) As the note on Figure 2.4-11 states, however, compliance with the requirements of the PA, CHPMP mitigation measures, and EIR mitigation measures CUL-1a-9 and CUL-1a-10 will prevent direct impacts on the Topock Maze as archeologically manifested. With respect to the claim about tribal participation in the EIR process, PG&E notes for the record that DTSC provided all stakeholders, including Tribes, with the opportunity to comment on the Draft and Final EIR pursuant to CEQA, and made a special effort to consult with interested Tribes. This effort to communicate with interested Tribes is summarized in the Final EIR at Volume 1, page 4-201, and Volume 2, pages 4.4-14, 4.4-26 to 4.4-37. Interested tribes availed themselves of the opportunities to comment, for example by submitting numerous comments on the Draft EIR. (See Final EIR, Vol. 1, at pp. 4-185, 4-191–96, 4-200, 4-202, 4-204–9, 4-218–19.) The Final EIR responds to the comments from interested Tribes and numerous changes to the EIR were made based on input from the interested Tribes. (Id. at pp. 4-186–90, 4-197–99, 4-201, 4-203, 4-210–17, 4-220–21.) With respect to impacts on the Maze, PG&E is committed to complying with the state and federal				PG&E evaluated moving all NTH IRZ wells to the east side of National Trails Highway and the results of the evaluation was presented at the February 11, 2014 TWG meeting (map is included in **Attachment D**, at the end of this table). PG&E understand that this comment is resolved.	Several figures in the 90% BOD show all NTH IRZ wells on the east side of National Trails Highway (e.g., Figures ES-4A, ES-10, etc.)

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					mitigation measures to ensure that the Project will not have a direct impact on the Maze as it is archeologically manifested. PG&E understands that the Tribes have conducted a Tribal Cultural Values Assessment, which is currently under review by the agencies and PG&E. The issue of the Maze boundaries and the Project's compliance with applicable state and federal mitigation measures will thus be a subject of further discussion between PG&E, the Tribes, and the agencies. In response to the question about the possibility of placing the infrastructure on the east side (instead of the west side of NTH), and based on the comment clarification discussion with the Tribes on 9/5/13 and subsequent discussions at the December 2013 TWG meeting, PG&E reviewed the locations of all provisional IRZ wells below the mesas and determined that these provisional wells could be moved to the east side of NTH. Specifically, the proposed new locations for four wells (IRZ-12, IRZ-14, IRZ-22, and IRZ-24) were included on a map that was made available to stakeholders, Tribes, and the agency representatives who participated in the October 28, 2013 site walk (map is included in **Attachment D**, at the end of this table).					
Specific Comments – Sections 3.1 and 3.2 (Additional comments on Sections 3.1 and 3.2 are included with Appendix B Modeling)										
85	DOI-35	Section 3.1.1, Page 3-1	"… (3) short-term responses to pump testing events; … ."	Are there any long-term pump test data available within the alluvial aquifer within the site boundaries from earlier site operations (supply wells) or investigations?	There were no pump test data, either long or short term, available from the former alluvial supply wells at the compressor station site. All of the pump test data pertinent to the alluvial aquifer at the compressor station has been developed during the remedial investigations and interim measures activities at the site.		Comment resolved.		Comment resolved.	Not applicable
86	DOI-36	Section 3.1.2, Page 3-2		The in-text citation for Zheng (1990) is inconsistent with formatting. A consistent format should be used.	The in-text citation will be changed to "(Zheng 1990)".					90% BOD Section 3.1.2.

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87	MWD-6	3.1, Appendix B, Section 4	Constant flux boundary for wells.	The text does not describe how groundwater extraction/injection is assigned to respective wells in the model. The flux can be explicitly assigned to each well node (i.e. layer) or can be assigned passively using MODFLOW's Multi Node Well Package. The latter approach would be preferred based on the planned screens crossing multiple aquifer/model layers that would produce/receive flow dependent on the layer's hydraulic conductivity. Explicitly assigning the flux for extraction/injection well layers could erroneously estimate the amount of plume or reactant capture and/or movement.	The multi node well package was utilized to automatically distribute the extraction/injection rates across multiple layers at a single well based upon the simulated transmissivity. In the instances where discrete screen intervals were anticipated, layer-specific rates were assigned directly.				Comment resolved.	Not applicable
88	DTSC-24	Section 3.2.1.1, Well Maintenance and Rehabilitation Reagents		Please provide the MSDS for NuWell 120 and NuWell 310 as part of the project H&SP.	Material safety data sheets for NuWell 120 and NuWell 310 will be provided as part of the project H&SP.	Okay.			Comment resolved.	O&M Manual Volume 5.
89	DOI-37	Section 3.2.1, Pages 3-4 and 3-5	"● Up to 24 injection wells (i.e., NTH IRZ Injection Wells) situated … ." "● One provisional extraction well (IRZ-40) and up to 30 … ."	The 16 locations and 19 locations of the more numerous injection wells referenced in these bullets are not evident from the map. Suggest deleting the term "locations".	Note that the map (Figure 3.0-1) depicts the 16 NTH IRZ Injection Well locations and 19 provisional NTH IRZ Injection Well locations and not individual wells. In some cases, multiple wells will be installed at a single location, hence the distinction between "wells" and "locations". The legend of Figure 3.0-1 will be updated as follows: 1) green triangular marker will represent "Injection Well <u>Location</u> (NTH IRZ)" instead of "Injection Well (NTH IRZ)"; and 2) gray triangular marker will represent "Future Provisional Injection Well <u>Location</u>" instead of "Future Provisional Injection Well". No changes to the text are proposed.		Comment resolved.		Comment resolved.	90% BOD Figure 3.1-1.
90	DTSC-25	3.2.1.1/3-7	In-well components include pneumatic packers	Please consider using self-sealing threaded packers for ease of use and longevity in lieu of the pneumatic packers.	PG&E proposes to use fixed head packers that may be pneumatically or hydraulically inflated to isolate zones within a well. These packers are capable of higher inflation pressures, which are required due to the anticipated pressure differentials during operation of the remediation wells. Further, the seal can be monitored to confirm packer functionality. K-packers are typically only used for low-pressure differential applications. K-packer	Comment resolved. See response to comment #232 DTSC-103.			Comment resolved.	Not applicable

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					seal integrity is not capable of being monitored and may allow for injected carbon amended water to be forced past the packer and into a screen interval that was not targeted for the solution. Please see response to comment #132 DTSC-40 and #232 DTSC-103 for discussion on the application of packers for long-term zone isolation for groundwater monitoring purposes versus short-term isolation for remediation purposes.					
91	FMIT-24 Hualapai-17 Chemehuevi-17 Cocopah-17 CRIT-17	Section 3.2.1.1 p. 3-5 to 3-10	General comment regarding subheading “Description,” which describes the recirculation system design and components	Much information is presented in this section. Could the section be subdivided and explained in greater detail by subcategories or subheadings?	Section 3.2.1.1 (p. 3-5 to 3-10) is currently subdivided with subheadings. Exhibit 3.2-1 was added to the 60% Design Submittal to supplement the text based on comments on the 30% Design Submittal. Additional detail regarding the recirculation system design and components are included elsewhere in the 60% Design Submittal, as referenced in Section 3.2.1.1. PG&E will evaluate how to further subdivide Section 3.2.1.1 in the 90% Design Submittal to provide greater clarity for the reader.			Comment resolved pending review of 90% BOD.	Comment resolved.	90% BOD Sections 3.2.1, 3.2.2, and 3.2.3.
92	DOI-38	Section 3.2.1.1, Page 3-5		The text indicates the presence of 24 NTH IRZ injection wells. Figure 3.1-1 shows 21 NTH IRZ well locations. Please review and revise as necessary.	Figure 3.1-1 depicts "NTH IRZ Well Locations" and not individual NTH IRZ Injection/Extraction Wells. There are 16 total NTH IRZ Injection Well locations and four total NTH IRZ Extraction Well locations, i.e., 20 total NTH IRZ well locations. NTH IRZ well location IRZ-18 is a provisional location and should correlate to the adjacent, un-numbered pink "provisional" dot on Figure 3.1-1. The purple dot currently labeled as IRZ-18 is an error, and this extra purple dot will be removed from Figure 3.1-1 and Figure 6.4-2 (same figure in Appendix B of the 60% BOD).		Comment resolved.		Comment resolved.	90% BOD Figure 3.1-1.
93	DOI-39	Section 3.2.1.1, Page 3-6	“The identification of separate, laterally-continuous litho-stratigraphic or hydrostrati-graphic zones … .”	It is suggested that the word “supported” be used instead of “facilitated” when describing the lack of laterally continuous units. Use of the term “facilitated” makes it sound like the borehole log lacks sufficient detail to perform the analysis. Note – this paragraph is used numerous times in the text and figures of the BOD and appendices and should be	The referenced sentence will be revised to read as follows (added text shown in underline typeface and deleted text shown in ~~strikethrough~~ typeface): "The identification of separate, laterally-continuous lithostratigraphic or hydrostratigraphic zones by means of correlation from borehole to borehole is not ~~facilitated~~ supported by the information given on the		Comment resolved.		Comment resolved.	90% BOD Sections 3.2.1, 3.2.2, 3.2.3, and 3.2.5.

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				changed throughout.	borehole logs." This sentence will be modified in all places throughout the report.					
94	DOI-40	Section 3.2.1.1, Exhibit 3.2-1 And Section 3.2.1.1, Page 3-9	Exhibit 3.2-1 Carbon substrate dosing and flow rate 3.2.1.1 Organic Carbon Dosing and Delivery Strategy	PG&E learned from its work at the Hinkley Compressor Station site that arsenic had a two fold increase and manganese had a 249 to 2186 fold increase in concentrations with the introduction of ethanol into the aquifer system. Similar results were observed during the Topock site pilot tests. PG&E plans on making field adjustments to chemical infusion/amendment concentrations to find the right dose to minimize the generation of byproducts. What is the basis for the 100 mg/L nominal concentration for carbon substrate dosing and the nominal flow? To what extent is the dosing value based on experiences at Hinkley?	The 100 mg/L nominal concentration for carbon dosing is based on the results of pilot testing and solute transport modeling. Specifically, pilot test results indicated that Cr(VI) reduction could be achieved with TOC dosing of between 10 and 50 mg/L carbon (Appendix B, Section 3.4-1). The injection concentration of 100 mg/L carbon is based on the results of solute transport modeling, which indicate that the injection of 100 mg/L carbon achieves the distribution of 10-15 mg/L of TOC in the zones between injection wells that is necessary to achieve a complete IRZ (see Appendix B, Section 6.4.1). The following text describing the use of pilot test results and solute transport model predictions to inform TOC injection concentrations will be added to Section 3.2.1.1 in the 90% Design Submittal: "Based on ISPT results summarized in Section 3 of Appendix B, a sustained TOC concentration between 10 and 50 mg/L is sufficient to establish chromium reducing conditions. The injection concentration of 100 mg/L carbon is based on the results of solute transport modeling, which indicate that the injection of 100 mg/L carbon achieves the distribution of 10 to 15 mg/L of TOC in the zones between injection wells that is necessary to achieve a complete IRZ (see Appendix B, Section 6.4.1)" The dosing value was based on pilot test data and solute transport modeling specific to the Topock site, rather than the Hinkley site. However, the concentrations proposed for Topock are consistent with the range of concentrations applied at Hinkley, i.e., 5 to 400 mg/L TOC.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Section 3.2.1.

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95	DOI-41	Section 3.2.1.1, Page 3-9, Portable Tanks		It should be noted that portable tanks may be used with provisional wells in the future for treatment of recalcitrant zones.	The following text will be added to Section 3.2.1.1 – Portable Tanks: "<u>In addition, portable tanks may be used with provisional wells in the future for treatment of recalcitrant zones.</u>" See also response to comment #96a FMIT-25 for information regarding the anticipated footprint for portable tank use.		Comment resolved.		Comment resolved.	90% BOD Section 3.2.1.
96a	FMIT-25		Section 3.2.1.1 p. 3-9	A topic at the 6/18/2013 TWG meeting in Henderson included a discussion of individual well footprints. The added footprint of portable tanks at the wellhead was not discussed. Furthermore the visual and cultural impacts associated with presence of portable tanks have not been evaluated within the groundwater EIR. In addition the Tribe has not been asked which wellheads would be an acceptable location for a portable tank. The impacts associated with use of portable tanks should be evaluated with input from the Tribes, and the added footprint at the wellhead should be clearly documented and presented to the Tribes for input.	The intention of the section of the text in question was to describe the flexibility of the design that allows for the injection of carbon substrate directly to a well through connections in the well vault in the NTH IRZ. The 90% Design Submittal will be clarified to also include this flexibility for the TCS and IRL injection wells. Portable tanks are not anticipated to be "installed" at wellheads for semi-permanent use. Rather, it may be necessary at times during the remedy to complete those injections by pulling a portable tank to the well on a trailer or in a smaller vehicle carried by an operator during work hours. The anticipated footprint of these operations will be similar to that for sampling or maintenance. See Draft O&M Manual, Volume 2, Appendix A, SOP-A13 for spill prevention, containment, and control measures for well development, sampling, and purging.	The potential use of portable tanks was fully disclosed as part of Chapter 3, "Project Description" in the Groundwater Final EIR. As a program-level analysis, the visual and cultural impacts associated with all potential types of infrastructure were described in the Final EIR to the extent practicable given the level of design detail available at the time. The impact analysis presented in the Final EIR was provided for the "proposed project" which includes the construction of wells, pipelines, access roads, and other project facilities including tanks (which could include portable tanks based on the Project Description provided in the Final EIR). See supporting text from the Final EIR in Project Description - pp 3-14 Reductant Storage and Associated Facilities, pp. 3-22 Construction of Wells, pp 3-27 Operation and Maintenance of Proposed Project; Aesthetics – pp 4.1-25, pp 4.1-28 Table 4.1-2.			This comment and PG&E's response were discussed with the Tribes at the October 16-17, 2013 TWG meeting.	90% BOD Sections 3.2.2 and 3.2.3 O&M Manual Volume 1 Section 2.1.
96b	Hualapai-18 Chemehuevi-18 Cocopah-18 CRIT-18	Section 3.2.1.1 p. 3-9	*"Portable Tanks. The NTH IRZ Injection Well design will include manual addition ports to accommodate the potential use of portable tanks (5- to 1,000-gallon capacity) for the direct*	A topic at the 6/18/2013 TWG meeting in Henderson included a discussion of individual well footprints. The added footprint of portable tanks at the well head was not discussed. Furthermore the visual and cultural impacts associated with presence of portable tanks have not been evaluated within the groundwater EIR. In addition the Tribes have not been asked which well heads would be an acceptable location for a portable tank. The impacts associated with use of	See response to comment #96a FMIT-25.	See response to comment #96a FMIT-25.			See #96a FMIT-25.	90% BOD Sections 3.2.2 and 3.2.3 O&M Manual Volume 1 Section 2.1.

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			injection of dilute carbon substrate solution at the wellheads. This alternative means of reagent delivery allows for added flexibility in long-term system operation, and portable tanks can be used for specific, targeted injections on an as-needed basis. Portable tanks may be preferred over pipelines at locations where the carbon injection volume is low, injections occur with long rest periods, or long pipelines are expected to pose health and safety and/or long-term O&M challenges. Portable tanks may also be used in conjunction with substrates that are perishable (e.g., whey) and/or exhibit a long biodegradation half-life to facilitate a low volumetric dose."	portable tanks should be evaluated within the EIR with input from the Tribes and the added footprint at the well head should be clearly documented and presented to the Tribes for input.						
97	DOI-42	Section 3.2.1.1, Page 3-10, Well	"The dissolved Cr(III) will either be	Rather than state "… or will re-precipitate as pH is buffered …", which sounds counterproductive,	The sentence will be modified as follows (added text shown in <u>underline</u> typeface and deleted text		Comment resolved.		Comment resolved.	90% BOD Section 3.2.1.

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		Maintenance and Rehabilitation Reagents, 3rd paragraph	removed … .”	suggest the following language: “ … and any residual Cr(III) not removed will re-precipitate …”.	shown in ~~strikethrough~~ typeface): "The dissolved Cr(III) will ~~either~~ be removed from the well during rehabilitation, ~~or will~~ and any residual Cr(III) not removed will re-precipitate as pH is buffered following rehabilitation."					
98	DOI-43	Section 3.2.1.2, Page 3-11, In-Situ Pilot Tests, 3rd paragraph		The “short-circuiting” is not well explained, nor is there a discussion of how this “short-circuiting” will be adequately addressed by the design. Please provide clarification.	The following text will be inserted in this section to explain "short circuiting": "The Upland ISPT was designed with two recirculation wells. Each well was screened in two depth intervals (shallow and deep). Pilot test injections were performed by injecting into one of the two screened intervals at each well and extracting from the other interval—i.e., each dual-screened well was used for both injection and extraction. By injecting and extracting at different depths, the goal was to create a depth-dependent forced gradient laterally between the two wells. However, the result was that a substantial portion of the injected solution was re-extracted by the same well (from the opposing depth interval)—i.e., it "short-circuited" vertically, limiting lateral (horizontal) distribution of carbon away from the wells. This point is discussed in detail in Section 3 of Appendix B." A figure will also be included. This short-circuiting is addressed in the design by not using dual-recirculation wells. Each IRZ well will be used exclusively for either injection or extraction of groundwater at any given time, eliminating the possibility of vertical short-circuiting.	Suggest adding a figure to illustrate short-circuiting if not already included.	Comment resolved.		Comment resolved.	90% BOD Section 3.2.1.
99	DTSC-26	3.2.2 Inner Recirculation Loop. P.3-12 Also see Exhibit 3.2-2	…and (3) provide secondary protection for the Colorado River by controlling the migration of potential byproducts generated by the NTH IRZ in	This suggests that the shallow portion of the aquifer and river may not be protected by byproduct migration. Contingency measures may be necessary. Ensure shallow well monitoring is enhanced in this area (including evaluation of particle flow paths in the area).	An extensive monitoring program has been designed to evaluate byproduct migration downgradient of the NTH IRZ and in the vicinity of River Bank Extraction Wells in both the shallow and deep portions of the aquifer. This monitoring program (specifically, the IRZ downgradient monitoring and riverbank extraction/northern NTH extraction monitoring elements of the performance monitoring program,	What would be PG&E’s contingencies if the actual concentrations of by-products are higher than solute transport model predictions? What are the action levels and triggered response? If the model is correct, then all is fine, but if model is incorrect, PG&E must have response in place. There is concern that a contingency does not exist to			Comment resolved. Per DTSC request, particle track figures for Layers 1-4 were submitted to DTSC on March 11, 2014 (see **Attachment R** at the end of this table). Particle tracking figures will continue to be included in the 90% Design document.	90% BOD Section 3.2.2. 90% BOD Apdx B Section 6.5. O&M Manual Volume 3.

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			the deeper portion of the aquifer.		described in detail in Appendix L, Volume 2, Section 4.2) includes a combination of existing wells and proposed wells (wells H and O) which will provide adequate coverage for byproduct monitoring in the shallow zone. Cross sections along the NTH IRZ and the shoreline will be produced to show monitoring well screens and chromium plume delineations (included in **Attachment Q**, at the end of this table); these cross sections will help to illustrate monitoring well coverage in the shallow zone. Placement of the shallow monitoring wells was guided by the solute transport modeling results. Consideration of byproduct migration was an important element of monitoring well location, analyte selection, and sampling frequency. Simulated solute transport results indicate byproduct concentrations (Mn and As) generated from the NTH IRZ are within the range of the naturally occurring shallow Mn and As concentrations in the floodplain. Solute transport modeling is a superior tool for assessing remedy performance and designing the monitoring program; and PG&E recommends continued use of the solute transport model, rather than particle tracking, for monitoring well network design. Simulated flow fields will be provided to illustrate the simulated groundwater flow directions (included in **Attachment E**, at the end of this table). The flow fields will be generated with the same hydraulic parameters as the simulated hydraulic capture zones presented in Appendix B Section 6.5 and Figures 6.5-9 to 6.5-12. Contingency measures will be evaluated and presented in the 90% design.	capture/ mitigate potential eastbound byproducts or chromium in the floodplain south of RB-5 towards bedrock (e.g., MW-23). DTSC awaits proposed cross sections to aid in assessing monitoring programs. Comment resolved pending review of the 90% design.				
100	DTSC-27	3.2.2.1 Description. River Bank Extraction Wells, P.3-12		No provisional river bank extractions well locations are identified. As the river is a significant receptor important to all stake holders, it is requested that at least six provisional well locations be included as a contingency measure should additional extraction be needed to	Although no provisional River Bank Extraction Wells are identified, significant capacity and system flexibility have been built into the design of the river bank extraction system should additional extraction be needed. Modeling indicates that hydraulic capture of the deeper	A site walk was conducted on October 28, 2013. PG&E, tribes, stakeholders, and agencies attended. PG&E illustrated four potential provisional river bank extraction locations that were located in the field			Comment resolved.	90% BOD Section 3.2.2. 90% BOD Apdx B Section 6.4.2. O&M Manual Volume 1 Section 2.1.

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				control contaminants, byproducts, or enhance hydraulic control.	portion of the alluvial aquifer is achieved at a total average extraction flow rate of 150 gpm with operation of four of the River Bank Extraction Wells (see Table 3.2-2 of the BOD/60% Design Submittal). However, flexibility has been provided (1) with an additional well [RB-2], and (2) to increase the total flow rate to as much as 500 gpm should additional extraction capacity be needed. Additionally, all of the River Bank Extraction Wells have been designed with two screened intervals: a lower screened interval to target the deeper portions of the unconsolidated alluvial sediments and an upper screened interval to allow for shallow groundwater capture, if necessary. The shallow screens will be isolated from the well pump unless the need to pump in the shallow unit proves necessary. In addition to the operational flexibility measures summarized above, up to four future provisional River Bank Extraction Wells will be added (see map included in **Attachment D**, at the end of this table). The four proposed future provisional River Bank Extraction Well locations are located roughly midway between the five current River Bank Extraction Well locations (RB-1 to RB-5). Future provisional wells could potentially be installed at these locations to supplement extraction wells RB-1 through RB-5 if needed to provide the intended Cr(VI) migration control. Additional future provisional extraction well locations north of RB-1 or south of RB-5 were also considered. However, it is unlikely that installing a well further south of RB-5 would provide significant benefit because the saturated thickness decreases as the bedrock contact is approached in this direction. Additionally, the reducing rind extends down into model Layers 3 and 4 south of RB-5. Installing a well north of RB-1 would also provide minimal benefit because the diffuse Cr(VI) upgradient of the NTH IRZ will be contained by the northern NTH IRZ Extraction Wells. Potential	approximately half way between proposed RB wells. Locations were described as general areas that could be shifted as needed based on data gathered during implementation of the remedy. Attendees should be well informed regarding this matter and PG&E should proceed with its proposed modifications cited in the response to the left. Comment resolved pending review of the 90% design.				

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					locations for the additional provisional River Bank Extraction Wells will be selected during a later stage of the 60% BOD response-to-comment process considering both technical criteria and knowledge of sensitive areas. The precise locations of the provisional wells, including areas south of RB-5 and the need for additional extraction wells will be evaluated and considered as operational data is collected and system performance evaluated.					
101	DOI-44	Section 3.2.2.1, Page 3-13	"A packer will be installed in the well to separate the upper and lower screened intervals."	Will a dual packer system be used to isolate the zones?	A single fixed-head packer will be used to isolate the two well screens. This installation is detailed on Drawing M-05-01 in Appendix D.		Comment resolved.		Comment resolved.	90% BOD Appendix D Drawing M-05-01.
102	DOI-45	Section 3.2.2.1, Page 3-13	"The purpose of the upper screen is to allow . . . ."	The text states that the upper screen will be installed on the River Bank Extraction Wells to allow for <u>additional</u> groundwater capture if monitoring data indicate this is needed. This indicates groundwater is not pumped from the upper screen unless it is necessary. Please provide additional details on what the monitoring data would show that would trigger <u>additional</u> groundwater capture, and clarify that groundwater is indeed not continuously pumped from the upper screen. If the upper screens were to be pumped, what impact would they have on the capture zone?	The Sampling and Monitoring Plan provides extensive detail on what monitoring observations would trigger the need for shallow riverbank extraction, as addressed by NTH IRZ DQO-3 (Section 2.2.1, Appendix L, Volume 2). Specifically, shallow riverbank extraction would be implemented only if other measures to control byproduct generation and migration (e.g., adjustment of reagent type, dosing concentrations, injection rates, etc.) were ineffective (see Figures 2.2-2 and 2.2-5, Appendix L, Volume 2). A reference to the Sampling and Monitoring Plan (Appendix L, Volume 2) will be added to this paragraph in the 90% Design Submittal. Figures 6.5-10 and 6.5-11 of Appendix B show the estimated hydraulic capture in the shallow zone when the River Bank Extraction Wells are operated without shallow intervals on. As shallow screens are opened and riverbank extraction rates are increased, the capture zone in the shallow depths would expand, while maintaining the capture zone at deeper depths.		Resolved pending review of the 90% design.		Comment resolved.	90% BOD Section 3.2.2.
103	DTSC-28	Section 3.2.2.1, p. 3-14, 1st sentence and	Final determination of the screened	PG&E should describe how and when input on the screen intervals will take place. The decision process should be	Field procedures and a decision-making plan will be included in the Construction/Remedial Action Work	Comment resolved.			Comment resolved.	90% BOD Sections 3.2.1, 3.2.2, and 3.2.3.

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		subsequent well installation	intervals will be made based on information collected in the field associated with drilling boreholes for the River Bank extraction wells.	described.	Plan. General field construction communication procedures/protocols are included in Exhibit L2.2-3 of the Draft O&M Manual (p. L2-5).					
104	DOI-46	Section 3.2.2.1, Page 3-14, Inner Recirculation Loop Injection Wells, 1st paragraph		Supplement the discussion on the disposition of river bank extracted groundwater if freshwater is injected in to all four IRL wells.	The text will be modified as follows (added text shown in <u>underline</u> typeface and deleted text shown in ~~strikethrough~~ typeface): "However, the final ~~layout~~ <u>design</u> of the Inner Recirculation Loop <u>Injection Wells</u> will be flexible enough to accommodate either injection water source (i.e., extracted water from the River Bank Extraction Wells or fresh water from the freshwater supply system) <u>at each well</u> to minimize potential byproduct impacts. <u>All groundwater extracted from the River Bank Extraction Wells will be re-injected into one or more of the Inner Recirculation Loop Injection Wells. Total flow to the Inner Recirculation Loop Injection Wells will be supplemented with flow from the freshwater supply system, as needed.</u>"		Comment resolved.		Comment resolved.	90% BOD Section 3.2.2.
105	DOI-47	Section 3.2.3.1, Page 3-18, East Ravine Extraction Wells, 1st paragraph	" . . . this design has since been revised to five extraction wells operating at a total nominal flow rate of 5 gpm . . . "	This estimated long term flow rate (5 gpm) is half the previous estimate (10 gpm) based on the results of the short term pump tests identified in Section 2.1.2. Further, it is anticipated at this lower rate that the pumps may run "dry" and thus need to be operated on a cyclical basis. Should the combined flow rates over a long period of time result in more than one well being cycled on-off, what impact could this have on the estimated time to clean-up the site? Is it possible should more than one pump need to be cycled on-off that the capture zone may be disrupted and fragmented? If so, how would this be addressed?	East Ravine wells ER-1 to ER-4 are proposed to be operated at rates of 0.5 gpm each due to the low anticipated yield in the fractured bedrock. ER-6 located at Site H is proposed at 3 gpm due to the identification of a higher attainable yield at the MW-70BR-225 well. Given the variable nature of the fractured bedrock and the interconnectivity of these fractures, the actual yield of these wells will be evaluated during remedy operation and adjusted accordingly to obtain a maximum sustainable rate. Additional provisional east ravine wells will be considered in the event of poor performance of the proposed east ravine extraction wells (See response to comment #109 DTSC-30). It is not anticipated that cycling the east ravine bedrock extraction wells would have a		Comment resolved.		Comment resolved.	90% BOD Section 3.2.3.

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					significant impact on the capture zone because as the area in the vicinity of bedrock wells dewater, minimal hydraulic capture will occur. As the bedrock rebounds during an off-cycle, the groundwater will collect in the well(s). Once the well is turned back on the water will be captured due to the slow groundwater velocities in this area.					
106	DOI-48	Section 3.2.3.1, Page 3-18, East Ravine Extraction Wells, 4th paragraph	"The East Ravine Extraction Wells will be constructed using up to 12-inch nominal diameter well casing with one or two screened intervals . . . "	This text is inconsistent with the text found in Section 3.2.5.1 which calls for borehole design without a well screen with potential diameter of four inches.	The inconsistencies will be corrected in the 90% Design Submittal. It is anticipated that the extraction wells within the bedrock will be installed with one continuous open interval so that groundwater is extracted from all permeable fractures. If the wells penetrate intervals of poor rock quality, the borehole will be "sleeved" with well casing and/or screen to maintain borehole integrity during operation. If rock quality is so poor that fine-grained materials must be managed in the subsurface, then a conventional filter-packed screen might need to be installed.		Comment resolved pending review of the 90% design.		Comment resolved.	90% BOD Section 3.2.3.
107	DOI-49	Section 3.2.3.1, Page 3-18, East Ravine Extraction Wells, 4th paragraph	"Therefore, the screened intervals of the extraction wells as shown on Table 3.2-3 are preliminary, . . . "	A review of Table 3.2-3 identifies screen length but not the interval, nor does it mention multiple screens to target specific bedrock intervals. Is the word "interval" being used in the text to describe model layer? Also, in what model layers (screen intervals) will each of the East Ravine Extraction wells be set? Please provide some discussion on the hydrogeologic conditions that would merit multiple screens versus a single screen or open borehole.	The word "interval" does not specifically relate to model layers and is simply intended to identify the entire saturated thickness at a given location. Based on the specific capacity of existing wells constructed in the East Ravine area, it is anticipated that the East Ravine extraction wells will be installed to depths that happen to penetrate all model layers such that there is sufficient available drawdown during operation. See response to comment #106 DOI-48 regarding anticipated well construction.		Comment resolved.		Comment resolved.	90% BOD Section 3.2.3.
108	DTSC-29	3.2.3.1/3-18	The groundwater production and radius of influence of the East Ravine Extraction Wells is expected to be small.	Please utilize geophysical logging tools including an acoustic borehole televiewer, heat pulse flow meter, and video log. Conduct evaluation/interpretation of cores (fracture orientation, aperture, density, etc.) and packer testing in the exploratory boreholes to characterize fractures, hydraulic conditions (whether and at what depth fracture flow is occurring), and water quality. In addition, to determine transmissivity with depth, consider drop tests using blank	The design goal for the East Ravine Extraction Wells is to construct wells that will produce adequate flow with sufficient drawdown to maximize hydraulic control. Therefore, the key design criterion will be to have a borehole of sufficient depth to allow for the requisite available drawdown with a pump set in the open borehole. Well design and construction will be an iterative process of drilling and well testing as part of adaptive design. The use of geophysical methods and other kinds	Better understanding flow dynamics in bedrock is desirable and the design document needs to have provisions to utilize advanced techniques to assess fracture flow systems. Comment resolved.			Comment resolved.	Not applicable

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				borehole liners such as FLUTe.	of testing is not necessary to accomplish the design goals. A variety of tools, as listed, will be available to evaluate high production zones if determined necessary.					
109	DTSC-30	3.2.3.1 Description. East Ravine Extraction Wells, Page 3-18, and Exhibit 3.2-3	Initial estimates, presented in the 2009 CMS/FS, held that approximately 15 wells, pumping a combined total of up to 10 gpm, would be required to provide hydraulic capture of the area of Cr(VI) in the East Ravine bedrock. However, this design has since been revised to five extraction wells operating at a total nominal flow rate of 5 gpm (maximum of 9 gpm) based on data obtained from the more recent East Ravine groundwater investigations (see Section 2.1.2).	What aspects of the East Ravine investigation provided the basis to conclude that the five East Ravine Extraction Wells will be adequate to “provide hydraulic capture of the Cr(VI) impacted groundwater … in the East Ravine bedrock”? What about the plume to the southern portion of the site which have not been fully characterized? It is not clear why the original estimate of 15 wells at 10 gpm has been revised to 5 at 5 gpm. Clarifying text should be added in this section. Additional East Ravine provisional extraction wells seem appropriate based on the original estimate, inherently difficult remedial clean up posed by bedrock fractures, and difficulty accurately modeling bedrock.	As stated in Section 2.1.2 of the BOD/60% Design Submittal, the East Ravine groundwater investigations have shown that "there is no evidence to indicate any sizable potential for development of groundwater in the bedrock, although locally, small yields may be developed from fractures". In an effort to balance the objectives of maximizing mass capture while minimizing the footprint of the remedial system, four extraction wells were proposed in the East Ravine area. An additional well, ER-6, was proposed at Site H, utilizing existing monitoring well MW-70BR-225, because elevated Cr(VI) groundwater concentrations were detected at this location and a relatively high groundwater extraction rate could be obtained. One provisional well (ER-5) has been identified to accommodate data to be collected in the southern portion of the site (Site K, near MW-72BR). Clarifying text to this effect will be added to Section 3.2.3.1. Up to six future provisional East Ravine Extraction Wells will be added as a contingency measure should additional extraction capacity be needed (see map included in **Attachment D**, at the end of this table). Potential locations for these wells will be selected during a later stage of the 60% BOD response-to-comment process considering both technical criteria and knowledge of sensitive areas.	Resolution dependent upon clarifying text to be added in the 90%. A site walk was conducted on October 28, 2013. PG&E, tribes, stakeholders, and agencies were invited to attend. Potential provisional well locations/ areas were described as areas along the general length of the old trails highway. The length of the road at interest was walked. PG&E should now proceed with its proposed modifications cited in the response to the left.			Comment resolved.	90% BOD Section 3.2.3. O&M Manual Volume 1 Section 2.1.

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110	DOI-50	Section 3.2.3.1, Page 3-18, TCS Injection Wells, 1st paragraph	"The two TCS Injection Wells will each receive . . . "	The combined nominal **injection** flow is 27 gpm. Please change and modify the statement accordingly.	The text will be revised as follows to clarify (inserted text shown in <u>underline</u> typeface and deleted text shown in ~~strikethrough~~ typeface): "<u>Each of</u> ~~T~~ the two TCS Injection Wells will ~~each~~ receive approximately 13.5gpm of carbon-amended groundwater for a combined nominal <u>injection</u> flow rate of 27gpm..."		Comment resolved.		Comment resolved.	90% BOD Section 3.2.3.
111	DTSC-31	3.2.3.1 Description. TCS Injection Wells, P.3-18	....and injections will be timed to allow for adequate dispersion of the injectate away from the well.	Clarify the meaning of "dispersion" in this section.	The sentence will be modified as follows (added text shown in <u>underline</u> typeface and deleted text shown in ~~strikethrough~~ typeface): "...and injections will be timed to allow for adequate lateral distribution ~~dispersion~~ of organic carbon ~~away from the well~~."	Okay.			Comment resolved.	90% BOD Sections 3.2.1 and 3.2.3. 90% BOD Exhibit 3.2-3.
112	DTSC-32	3.2.3.1 Description. TCS Injection Wells, P.3-18	Results of the modeling effort indicate that the potential for westward flow from the TCS Injection Wells, and the resulting westward expansion of the plume, is sufficiently mitigated by the natural eastward flow gradient and the injection of fresh water at FW-2...	Actual monitoring will need to be conducted to the west to verify the modeling effort. This section should discuss or reference the monitoring that will be conducted to assess anticipated hydraulics and aquifer chemistry. PG&E should consider how best to monitor for potential westward expansion/ containment of the plume. Well installation west of the TCS injectors should be evaluated to ensure an adequate monitoring program is in place.	Agreed that monitoring should be conducted to ensure that the Cr plume is adequately controlled to the west of the TCS injections. Several lines of evidence will be used to evaluate groundwater flow and plume control in this area. First, groundwater elevations will be measured and the hydraulic gradients will be evaluated to see if the model predicted gradients and hydraulic control are realized. Second, analytical data will be collected from monitoring wells to the west of the TCS injections. Monitoring wells MW-10 and MW-38S/D have been specified to the west of the TCS as inner plume compliance wells (Table 2.1-2 of the Sampling and Monitoring Plan, Volume 2 of Appendix L) which are used to ensure that Cr(VI) concentration trends behave within expectations per Compliance DQO-2 (RAO 3) in Section 2.1 of the Sampling and Monitoring Plan. In addition, MW-9, located south of MW-10 and to the west of the TCS, will be added to the monitoring program network as an additional inner plume compliance well. Chromium concentration trends will serve as an indicator of whether the high concentration (several milligram per liter) plume in the vicinity of the	DTSC is considering the use of conservative tracers be added to TCS-1 and TCS-2 injection wells and monitored in western Bat Cave Wash monitoring wells. The 90% design should allow for tracers if other lines of evidence are inconclusive.			Comment resolved.	90% BOD Section 3.2.3. O&M Manual Volume 2 Sections 2.1 and 2.2.3.

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					TCS injection wells is migrating beyond expectations to the west. TOC and byproduct concentration trends can also serve as indicators for whether TCS injected water is migrating further to the west than predicted by solute transport modeling. TCS tracer injections and monitoring in Bat Cave Wash would verify that injection fluid is not migrating westward, but would not be as conclusive as chromium concentration trends to confirm that the plume is not being pushed by TCS injections. A TCS tracer study is therefore not recommended.					
113	DOI-51	Section 3.2.3.1, Page 3-19, Organic Carbon Substrate Amendment System (Transwestern Bench)	"Groundwater extracted from the Transwestern Bench carbon amendment system will include . . . "	Please discuss the conditions that would require the TWB extraction well flow to be directed to the IRZ, and the impact to remediation of the Cr(VI) plume under the TCS.	The primary destination for the TWB extracted groundwater is still the TCS Injection Wells for remediation of the Cr(VI) plume under the TCS, although flexibility is included in the design to re-direct to the NTH IRZ if needed or warranted. Such conditions may include, but are not limited to: 1) if TCS Injection Wells need to be slowed or turned off, re-direction to the NTH IRZ would allow TWB and East Ravine extraction to continue; 2) if at later times in the remedy operation the TCS carbon injections are sufficiently successful that the need for additional injection is reduced; and 3) to supplement the carbon-amended NTH IRZ injection if additional injection is needed to sustain a continuous injected carbon front to prevent Cr(VI) breakthrough and TCS injection needs can be met at the same time. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of the 90% design.		Comment resolved.	90% BOD Section 3.2.3.
114	DOI-52	Section 3.2.3.2, Page 3-20, 2nd paragraph	"Furthermore, although the borehole drilled at MW-70BR-225 during the second phase of investigation yielded enough groundwater to sustain pumping for hydraulic	Does this statement indicate a low specific yield resulting in a sharp drawdown near the pump test well, combined with a low aquifer storage, causing negligible impacts on drawdown in nearby monitoring wells? If so, will current proposed well spacing establish a capture zone that will be maintained and provide an unbroken hydraulic barrier stopping eastward migration of contaminants to the river?	The performance of extraction wells screened in bedrock is dependent on secondary porosity features such as fracture density, fracture aperture, and the interconnectivity of the fractures. Due to the variability of these features in the subsurface, the performance of these wells will be best evaluated by the monitoring well network and the total groundwater volume extracted from each well after remedy implementation. East ravine		Comment resolved.		Comment resolved.	90% BOD Section 3.2.3.

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			testing, the drawdown measured in the observation wells was negligible."		provisional wells were identified (see comment response #109 DTSC-30) in the event that additional extraction/hydraulic control is needed in the vicinity of the proposed bedrock extraction wells.					
115	DTSC-33	3.2.3.3 Uncertainties and Assumptions, Page 3-20	The TCS Recirculation Loop will be implemented and operated using an adaptive approach, similar to operation of the NTH IRZ system—data will be collected from select monitoring wells, and operations will be modified to optimize the remedy performance.	Due to the adaptive approach described, it would appear that additional provisional wells should be called out in the event they are needed.	Two provisional TWB Extraction Wells (TWB-3 and 4) were identified, along with additional provisional East Ravine Extraction Wells (see response to comment #109 DTSC-30). Provisional TCS Injection Wells were not identified as these wells are designed to accelerate the remedial timeframe by injecting carbon amended water into areas with elevated Cr(VI) concentrations. Operational rates of the TCS recirculation loop need to be controlled in order to prevent western migration of the plume. Additional language will be added to the 90% design discussing the need for flexibility to locate wells in the future as the remedial program evolves. Any modifications would be discussed with stakeholders prior to implementation.	During the Oct 2013 field visit, it was noted that additional/ alternate well locations might be possible north of TWB-3 (provided old roads were repaired and regarded). Also note comment #543 DTSC-152 discussing IRL-6 that might be used as an extractor and noting its location could be adjusted if necessary. Please note the above in the section and note that it provides some flexibility in adapting to uncertainties. Comment resolved pending review of 90% design.			Comment resolved.	90% BOD Sections 3.2.1, 3.2.2, and 3.2.3.
116	DOI-53	Section 3.2.4.1, Page 3-21	"The NTH IRZ contains significant lengths of extracted groundwater, carbon-amended water, and remedy-produced water conveyance pipelines."	It does not appear the CIP would address remedy-produced water conveyance pipelines. Please clarify.	The CIP system is also capable of operating in a closed loop through the main IRZ well backwash headers as depicted on Drawings I-04-02 and I-04-03 in Appendix D. The text of Section 3.2.4.1 will be amended to reflect this operational scenario.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Section 3.2.4.
117	DOI-54	Section 3.2.4.1, Page 3-21	"Within the pipe alignment will be a network of electrical ducts to route electrical power, control, and instrumentation conductors to the NTH IRZ extraction and	This sentence seems out of place and should be deleted.	The sentence will be deleted.		Comment resolved		Comment resolved.	90% BOD Section 3.2.4.

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			injection wells."							
118	DOI-55	Section 3.2.4.1, Page 3-21, 7th sentence	"The reagents used will be those categories of water treatment chemicals . . . "	The text specifies that the CIP reagents will be determined in bench-scale testing. When and how will this testing be performed?	See response to comment #121 FMIT-26 and Hualapai/Chemehuevi/ Cocopah/CRIT-19. An SOP and further description will be provided in the 90% Design Submittal.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Section 3.2.4. O&M Manual Volume 1, Appendix B IRZ-SOP-10.
119	DTSC-34	Exhibit 3.2-4	Maintenance reagent – to be determined	The reagents to be considered should be listed no later than 90% design. Since the reagents are selected based on those approved for drinking water systems, they should be readily available and listed.	The anticipated chemicals would be similar to those used for well rehabilitation and listed in Exhibit 4.2-5 of the O&M Plan, Volume 1 of the O&M Manual. Sodium hydroxide is the only chemical of note that is not listed on Exhibit 4.2-5. A separate exhibit specific to the CIP system will be included in the 90% Design Submittal.	Okay			Comment resolved.	O&M Volume 1 Exhibit 5.1-1.
120	DTSC-35	Section 3.2.4.1, CIP system description. p. 3-21	Ultimate selection of an effective reagent(s) will require bench-scale testing of actual scale deposits.	When and how will this be done? PG&E should provide details in O&M manual.	See response to comment #121 FMIT-26 and Hualapai/ Chemehuevi/Cocopah/ CRIT-19. An SOP and further description will be provided in the 90% Design Submittal.	Okay			Comment resolved.	90% BOD Section 3.2.4.
121	FMIT-26 Hualapai-19 Chemehuevi-19 Cocopah-19 CRIT-19	Clean-In-Place System Exhibit 3.2.4 p. 3-21	*Ultimate selection of an effective reagent(s) will require bench-scale testing of actual scale deposits.*	What are "actual scale deposits?" When will the SOP for the bench scale testing be developed? This testing procedure should be reviewed in a TWG forum.	In order to optimize the CIP cleaning solution we will need to wait for the scale to potentially develop within the pipe network and then test different solutions on samples of the scale (i.e., the "actual scale deposits"). A general SOP for the bench scale testing can be included in the 90% Design Submittal, although if implemented the bench-testing procedures will likely be refined based on the observed scaling issues. Reference Exhibit 4.2-5 from the O&M plan for a list of potential cleaning chemicals. Any supplemental chemicals such as sodium hydroxide will be included in the 90% design documents.			Comment resolved pending review of 90% design documents.	Comment resolved.	90% BOD Section 3.2.4.
122	DOI-56	Section 3.2.5.1, Page 3-22, Screened Interval	"Final determination of the screened intervals will be made based on information collected in the field associated with drilling	What tools and methodologies will be used to determine screen intervals in the field? Who will make the determinations? Since Appendix C is large, please reference where in Appendix C one can find the proposed tools and methodologies.	The 90% Design Submittal will clarify that the reference refers to Attachment D of Appendix C (Design Bulletin: Remediation Well Design and Field Construction Approach). Field procedures and a decision-making plan will be included in the Construction/Remedial Action Work Plan. General field construction		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Section 3.2.5.

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			boreholes for the injection wells. Appendix C provides a summary of potential field data collection tools and methodologies . . . "		communication procedures/ protocols are included in Exhibit L2.2-3 of the Draft O&M Manual (p. L2-5).					
123	DOI-57	Section 3.2.5.1, Page 3-22, Screened Interval		Is it PG&E's intention to install well casing into bedrock to finish the well? If so, how deep will the casing be set into bedrock and how will this be accomplished?	See responses to comments #106 DOI-48 and #107 DOI-49.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Section 3.2.3.
124	DOI-58	Section 3.2.5.1, Page 3-23, Screen Diameter	"The East Ravine Extraction Wells which will be installed in bedrock may be of open hole design without a well screen and may be of smaller diameter . . . "	The text should indicate that surface casing will be installed in the East Ravine Extraction Wells.	Comment noted. The text will be modified as follows (inserted text shown in underline type face, deleted text shown in ~~strikethrough~~ type face): "The East Ravine Extraction Wells which will be installed in bedrock may be of open hole design ~~without a well screen~~ and may be of smaller diameter (potentially 4-inch diameter in the open borehole portion of the well) than the remediation wells installed in the unconsolidated aquifer. If an open borehole completion is used, a cemented surface casing will be installed in compliance with California well standards."		Comment resolved.		Comment resolved.	90% BOD Section 3.2.5.
125	DOI-59	Section 3.2.5.1, Page 3-23, Screen Diameter	" . . . (potentially 4-inch diameter in the open borehole portion of the well) . . . "	What criteria will be used to determine the diameter of the boring and consequently the open borehole portion of the well?	Previous wells in the East Ravine area that are of open hole completion design have been drilled to a 4-inch boring diameter. This is the basis for the 4-inch diameter design. However, if field testing indicates that a larger borehole diameter could allow for a more effective well, then a larger boring diameter will be considered.		Comment resolved.		Comment resolved.	Not applicable
126	DOI-60	Section 3.2.5.1, Page 3-23, Casing and screen material and type		During the May TWG meeting, it was stated that replacement wells will be installed in the same hole by overdrilling. Please mention how replacement wells will be installed when the well is constructed of stainless steel and/or carbon steel.	Installation of a replacement well in the same hole by overdrilling is one option available and discussed in the FEIR. In addition, well replacement may be completed within a new borehole located in the area of the original well when the well is constructed of stainless steel or carbon steel. A reference to Section 4.2.2.5 "Well Replacement" of the O&M Plan will be included in a new		Resolved pending review of the 90% design.		Comment resolved.	90% BOD Section 3.2.5.

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					bullet that will be added to this section of the 90% Design Submittal.					
127	DOI-61	Section 3.2.5.2, Page 3-23	"In general, pipe materials are selected . . . "	Please explain when pre-cast concrete trenches will be used versus a standard construction trench.	Pre-cast concrete trenches will be used for segments of the pipelines where an active roadway or access driveway is located over the pipeline that is expected to need periodic access for maintenance purposes or where extended periods of maintenance would affect use of the road. These areas include, but are not limited to, the driveways accessing the MW-20 bench from NTH, the portion of NTH in front of the Transwestern Bench, segments of the pipeline inside the compressor station, and segments of the pipelines in the Uplands area.		Comment resolved.		Comment resolved.	Not applicable
128	DTSC-36	3.2.4.1/3-23	Screen diameter	Please use a screen for the East Ravine Wells to allow for longevity and avoid long-term well rehabilitation issues or well replacement.	See response to comment #106 DOI-48 regarding anticipated well construction for extraction wells in the East Ravine area.	Okay.			Comment resolved.	90% BOD Section 3.2.3.
129	DTSC-37	3.2.4.1/3-23	Casing and screen material type	Please include louvered screened as depicted in Appendix D with a final determination based on field parameters.	Material in Appendix D (M-02-02) will be changed to "stainless steel well screen" in place of "stainless steel louver well screen". Stainless steel, wire-wrapped screen will be used for the IRZ wells.	Comment resolved.			Comment resolved.	90% BOD Apdx D Drawing M-02-02.
130	DTSC-38	3.2.4.1/3-23	Wells seals	Please provide the installation method to provide the neat cement seal between screen intervals for the wells.	Comment noted. The following text will be added: "<u>Neat cement will be installed via tremie grout method.</u>"	Okay.			Comment resolved.	90% BOD Section 3.2.5.
131	DTSC-39		Figure 3.1-1	One extra well appears to have been added near IRZ-18. Please revise.	This error will be corrected in both Figure 3.1-1 and Figure 6.4-2 (same figure in Appendix B of the 60% BOD). NTH IRZ well location IRZ-18 is a provisional location and should correlate to the adjacent, un-numbered pink "provisional" dot on Figure 3.1-1. The purple dot currently labeled as IRZ-18 is an error, and this extra purple dot will be removed.	Okay.			Comment resolved.	90% BOD Figures 3.1-1 and 6.4-2.
132	DTSC-40	3.1.4 Remediation System Design and Analysis, P.3-4	Figures 3.1-2 to 3.1-6	Footnotes to the cross sections indicate that numerous packers will be used as part of the remedy. PG&E has recently argued that well packers are only a short term solution for well monitoring and are prone to maintenance issues. Therefore, a contingency should be developed should packer maintenance be	While the packers proposed to be used in the remediation wells may be similar to those used in the East Ravine investigation, the method of use is different. Packers used for groundwater monitoring must remain inflated and functional for long periods of time (i.e., years) to maintain monitoring zone isolation,	Response noted. See response to comment #232 DTSC-103.			Comment resolved.	90% BOD Appendix B Figure 6.4-2.

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				problematic over the years that the remedy will operate.	while those used as integral components of a remediation system may be removed and re-installed periodically for well or packer maintenance. Packers used in remediation wells serve to isolate screened intervals and facilitate the distribution of varying quantities of carbon amended water to each screened interval individually, but long-term isolation is not a requirement. Therefore packers are ideal for use in remediation wells because there are opportunities to remove and maintain them, as necessary. During use, packer inflation pressures will be monitored by pressure instruments to ensure an adequate seal is maintained during injection operations. See response to comment #232 DTSC-103 for clarification on the use of packers in monitoring wells during the East Ravine investigation.					
133	DTSC-41	Figure 3.1-1	Conceptual Final Groundwater Remedy Cross-Section Locations	Please include iso-concentrations of the plume on the figure.	Plume iso-concentrations can be added to Figure 3.1-1 (and Appendix B Figure 6.4-2) with the consideration that there are variations in concentration vertically. Show the cumulative four-layer plume outline or to just generate four versions of this figure to display the plume distribution in each layer.	Please use the cumulative view on one figure and then use the cross-sections to show vertical distribution. Comment resolved pending review of 90% design.			Comment resolved.	90% BOD Figure 3.1-1 and Appendix B Figure 6.4-2.
134	DTSC-42	Figure 3.1-3	Conceptual Final Groundwater Remedy Cross-Section B-B’	Please provide additional wells north of IRZ-1 to fully address the lateral extent of the plume.	A review of historical data collected at MW-35-060 and MW-35-135, northernmost monitoring wells located adjacent to the proposed location of IRZ-1, indicates that Cr(VI) concentrations have oscillated at these wells but are generally below 32 ppb. The maximum Cr(VI) concentration observed at MW-35-060 was 35.8 ppb in March 2008, and the maximum Cr(VI) concentration observed at MW-35-135 was 37.8 ppb in December 2010. The concentration trends observed at MW-35-060 and MW-35-135 suggest that these wells define the edge of the Cr(VI) plume, and additional remediation wells installed to the north of IRZ-1 will provide negligible value for treatment. In addition, the simulated	The MW-35 cluster does not monitor the deep portion of the aquifer where PG&E’s cross-section B-B’ shows contamination to extend. It is requested that a deep well (e.g., greater than 300 feet bgs.) be installed in the vicinity of MW-35. An additional provisional well location to the north should be cited if this deep well encounters significant contamination. Comment resolved pending review of 90% design.			Comment resolved.	90% BOD Figure 3.1-3.

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					hydraulic capture zone of the northern NTH IRZ wells extends more than 100 feet to the north past IRZ-1 in Layer 2 (see Figure 6.5-10 of Appendix B) and more than 300 feet to the north past IRZ-1 in Layers 3 and 4 (see Figures 6.5-11 and 6.5-12 of Appendix B, respectively). As noted by the DTSC, the MW-35 cluster does not monitor the deep portion of the aquifer. The northern extent of the Cr(VI) plume in the deep portion of the aquifer along the NTH is currently defined by TW-4. Cr(VI) concentrations at this well have consistently been below 32 ppb since 2007. Additional Cr(VI) concentration data, including data from the deep portion of the aquifer, will be collected during installation of IRZ-1 and monitoring wells A and B to further delineate the extent of the plume to the north. Based on the additional information, an additional well to the north of MW-35 may be determined to be necessary. In addition, PG&E proposes to install an additional monitoring well northwest of MW-35 for remedy compliance monitoring (see also response to comment #651 DTSC-199).					
135	FMIT-23	Figure 3.1.3		This conceptual final groundwater remedy cross section depicts the extent of the infrastructure that could be intruding into this culturally sensitive area during the remedy and possibly permanently depending on the well decommissioning processes used. This visually describes a major part of the significant impact to the TCP caused by the proposed remedy.	PG&E has reviewed the locations of four provisional NTH IRZ wells (IRZ-12, IRZ-14, IRZ-22, and IRZ-24) located below the mesas and has determined that these provisional wells could be moved to the east side of National Trails Highway. The proposed new locations/areas for these four wells were included on a map that was made available to the stakeholders, Tribes, and agency representatives who attended the October 28, 2013 site walk, and were also discussed during the November 5 TWG meeting (map is included in **Attachment D**, at the end of this table). In response to clarifications from the Tribes during the December 12, 2013 TWG meeting, PG&E evaluated moving all NTH IRZ wells to the east side of National Trails Highway. The results of the evaluation was presented during the February 11, 2014 TWG meeting prior to the 90%				PG&E evaluated moving all NTH IRZ wells to the east side of National Trails Highway, the results of the evaluation was presented at the February 11, 2014 TWG meeting (map is included in **Attachment D**, at the end of this table). PG&E understand that this comment is resolved.	90% BOD Figure 3.1-3

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					design (map is included in **Attachment D**, at the end of this table).					
136	DTSC-43	Figure 3.1-4	Conceptual Final Groundwater Remedy Cross-Section C-C'	Please provide additional wells north of TWB-3 to fully address the lateral extent of the plume.	Originally, in the 30% Design Submittal, a well (MID-EX-1) was proposed to the north of TWB-3. However, this well was removed from the 60% Design Submittal due to constructability issues observed in the field: i.e., presence of multiple major gas pipelines, limitations on heavy equipment access, and evidence of significant erosion. In addition, although the intent of the TWB Extraction Wells is to accelerate capture/treatment of the portion of the Cr(VI) plume located immediately downgradient of the TCS, these wells are not intended to provide full capture/treatment. The portions of the Cr(VI) plume that are not within the simulated capture zone (e.g., to the north of TWB-3) are anticipated to pass through the NTH IRZ where they will be treated. The need and location of additional injection and/or extraction wells will be evaluated and considered as operational data is collected and system performance evaluated. This concept will be incorporated into the 90% design.	DTSC is concerned that, based on existing data, the highest chromium contaminant concentrations would be located between the compressor station and the MW-20 bench. Trying to attack the highest contaminant concentrations with this particular loop system seems beneficial. Keep note that IRZ well installation may better suggest where to locate these wells. Therefore a provisional well location/ alternative well location(s) should be based off the results of the IRZ installation and data collection. Can IRL-6 and/or IRL-7 also be utilized as extractors early on to focus on high chromium concentrations? PG&E and DTSC conducted a site walk on October 28, 2013. After viewing the area north of TWB-3, it was decided a well might be able to be cited in that area provided that dirt moving activities be conducted (e.g., repair former road from erosion, flatten/prep. site for drill rig). Therefore, DTSC requests that an additional provisional well be added to this area. Comment resolved pending review of the 90% design.			Comment resolved.	90% BOD Sections 3.2.1, 3.2.2, and 3.2.3.
137	DTSC-44	Figure 3.1-6	Conceptual Final Groundwater Remedy Cross-Section E-E'	Please provide additional wells north of IRL-6 to fully address the lateral extent of the plume.	Future provisional well IRL-7 is proposed to the north of IRL-6. Note that future provisional wells IRL-6 and IRL-7 were proposed as a contingency should monitoring indicate that cleanup is not progressing at the anticipated rate. These wells, located in the current central portion of the Cr(VI) plume, are designated as "late time" remedial wells that are intended to accelerate the remediation process once eastward migration of the Cr(VI) plume has occurred.	PG&E should consider the inclusion of some flexibility in the design document to allow IRL-6 to be moved a couple hundred feet to optimize remedy design based on data to be collected during remedy implementation. Also modify the design document to allow early startup of provisional wells IRL-6 and/or IRL-7 if determined necessary based on monitoring and operational data.			Comment resolved.	90% BOD Section 3.2.2.

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					Additional remediation wells were not proposed to the north of IRL-6 due to constructability issues and access/right-of-way limitations associated with construction in the area between I-40 and the BNSF Railroad. The accessibility issues in this area were previously discussed during the January 9, 2012 briefing and project area site walk that was led by representatives of PG&E and attended by members and representatives of the Fort Mojave Indian Tribe and the Hualapai Tribe.	Comment resolved, see also comment #136 DTSC-43.				
Specific Comments – Sections 3.3 through 3.6										
138	DTSC-45	3.3.1 Freshwater Supply Sources, Pages 3-24 and 3-25	Use of an existing well avoids the disturbance and the uncertainty about quantity and quality of supply that would be associated with drilling a new well.	This sentence should be revised as PG&E indicates that additional characterization (and disturbance) of the HNWR-1 area is needed as there is uncertainty regarding the hydrogeology of the area and even some concern with the construction of the well. Additional characterization is to be collected through implementation of the freshwater work plan.	The cited sentence will be deleted as requested.	In light of PG&E's recent Arizona supply well findings expressed on November 4, 2013, DTSC requests that the cited sentence simply be deleted. PG&E now contends that the HNWR-1 well has questionable construction that would affect its operation and maintenance and the location does not appear as desirable geohydrologically when compared to Site B. PG&E has proposed to drill a new well at Site B. Potential disturbances for a California well would likely be similar to those for Arizona wells.			Comment resolved.	90% BOD Section 3.3.1.
139	DTSC-46	3.3.1 Freshwater Supply Sources, Page 3-25	Although geochemical modeling indicates that this arsenic will not migrate far from the injection points and will dissipate within a reasonable period of time after the completion of the remedy, the RWQCB, subject to its invitation for PG&E to seek review by the SWRCB, indicated that	The use of the term "within a reasonable period of time" is subjective. As the RWQCB and, therefore, DTSC did not find this to provide sufficient merit for injection above the MCL, this statement is therefore moot and may or may not be reasonable. It should be replaced with the estimated number of years that it will take for the arsenic to return to pre-injection conditions.	The State Board letter dated November 20, 2013 provides the Board's rationale and conditions for allowing injection of naturally occurring arsenic above MCL without pre-treatment. The letter also states that the arsenic water quality objective must be met within the earlier of 20 years after achieving the RAO for Cr or 20 years after ceasing injection of water containing naturally occurring arsenic above MCL. On this basis, the term "within a reasonable period of time" could be interpreted as "within approximately 20 years".	Comment resolved based on interpretation by the State Board's November 20, 2013 letter. PG&E should, however, revise the sentence to specify "approximately 20 years after injection ceases for the remedy."			Comment resolved.	90% BOD Section 3.3.1.

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			the HNWR-1 water would likely need treatment to remove naturally occurring arsenic prior to injection.							
140	DTSC-47	3.3.1 Freshwater Supply Sources, Page 3-25	In addition, pumping fresh water from this area would have an adverse effect on the performance of the remedy.	Please delete the cited sentence. Recollection has it that the California pumping scenario had little, if any, effect on the remedy.	Model simulations presented in Attachment C of the Freshwater Source Evaluation Technical Memorandum suggest pumping from Park Moabi has a slight adverse effect on the cleanup time, however it is probably within the margin of error of the model, so the sentence will be deleted as requested.	Okay.			Comment resolved.	90% BOD Section 3.3.1.
141	FMIT-27 Hualapai-20 Chemehuevi-20 Cocopah-20 CRIT-20	Section 3.3.1 p. 3-25	*"The third option included in the CMS/FS was to obtain water from the Colorado River."*	This section does not mention that the Colorado River has high TOC concentrations (7 to 8 mg/L), and it is difficult to remove TOC using water treatment methods.	The following sentence will be added to this section: "<u>It is possible that the organic carbon might also need to be removed from the river water prior to injection, which is difficult to remove using conventional water treatment methods.</u>"			Comment resolved.	Comment resolved.	90% BOD Section 3.3.1. 90% BOD Exhibit 3.3-1.
142	DOI-62	Section 3.3.2, Page 3-26	"The primary drawback is that the aquifer at Moabi Regional Park does not appear to be capable of delivering a sufficient quantity of water for the remedial action . . ."	Please explain the basis of this statement. Is this statement based on well production history of an existing well?	The basis for this statement is found in a discussion of the performance of several previous and existing wells at Park Moabi, provided in the a tech memo titled *Freshwater Source Evaluation, PG&E Topock Compressor Station, Needles, California* , April 27 2012.		Comment resolved.		Comment resolved.	Not applicable
143	DTSC-48	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Page 3-26	The fact that it is an existing well means that there would be less disturbance associated with use of HNWR-1 than with construction of a new well or river intake.	Please delete the cited sentence as PG&E has stated concern with the geologic characterization at HNWR-1 and with the well itself and has proposed to disturb the area with borehole installation up to 400 feet and possibly with installation of a replacement well.	See response to comment #138 DTSC-45.	See response to comment #138 DTSC-45.			Comment resolved.	90% BOD Section 3.3.2.
144	DTSC-49	3.3.2 Evaluation of Freshwater Supply Sources/	Water quality data at the area of	Note: For consistency with the previous sentence in the document, please modify the sentence as	The sentence will be revised as requested.	Okay.			Comment resolved.	90% BOD Section 3.3.2.

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		Selection of Preferred Source, Page 3-26	injection exhibits high levels of naturally occurring fluoride.	indicated, "Water quality data at the area of injection exhibits elevated high levels of naturally occurring fluoride."						
145	DTSC-50	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Page 3-26	It is also likely that the TDS of the water from a high capacity well would be greater than 3,000 mg/L, making it undesirable for injection into the less saline, upper portions of the aquifer at the Topock site.	What are the TDS limits for freshwater injection at the Topock site. Language contained here suggests that discharge limits should be below at least 3,000 mg/L for the upper portion of the aquifer. Discharge limits for all analytes injected into the aquifer are needed.	The cited text refers to possible water quality from a hypothetical well at Moabi Regional Park. It should be noted that HNWR-1 water has a fairly low TDS level of approximately 500 mg/L. As discussed in response to comment #67 DTSC-20, setting discharge limits is not appropriate for the remedy due to the mixing that is necessary in the treatment zone. It is anticipated that as the lower TDS freshwater is injected and mixed with the higher TDS water (greater than 3000 mg/L) from the middle and deeper portions of the receiving water, the resulting TDS in the receiving water will be lower after injection than that before injection of freshwater. Water quality including electrical conductivity (related to TDS) will be monitored in sentinel wells at the injection areas and elsewhere throughout the site during the remedial action.	See response to #67 above. Discharge limits for all analytes injected into the aquifer are needed. DTSC is referring to FW and IRL wells outside the plume boundary and not the IRZ line. Please refer to the existing discharge requirements for IM-3 injections as starting point. PG&E should attempt to protect the low TDS shallow zone during FW and IRL injections. Perhaps high TDS waters can be preferentially injected into lower zones via packer systems or dedicated injection wells.			Discussion between DTSC, DOI, RWQCB, and PG&E is ongoing to resolve this comment. This topic will be carried forward. Resolution of this comment will be included in the 90% design. PG&E will also work on items related to this comment as directed in the Agencies' direction letter dated April 4, 2014.	90% BOD Sections 3.2.2 and 3.3.3 O&M Manual Volume 1 Sections 2.1 and 3.1
146	DOI-63	Exhibit 3.3-1, Page 3-27, 2. Quantity of Water Available	"At the time of this writing, PG&E has conducted a longer-term constant rate extraction test at HNWR-1 . . . "	How long was the extraction pump test run?	This test was planned to be a 96-hour test but it was cancelled at the last minute because Southwest Water needed to postpone the shut down and monitoring of water levels in Topock-2/3, until a later time. PG&E plans to conduct this test as part of the FWIP.		Comment resolved pending review of the 90% design.		Comment resolved.	Not applicable

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147	DTSC-51	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Exhibit 3.3-1, Page 3-27	While this has negligible effects on the rate of Cr(VI) removal, it could be important if there were some objectionable characteristic in the injected water because it is likely that some of the injected water would be drawn back close to or possibly within Park Moabi by the end of the active remedial action.	The cited sentence is speculative and confusing and should probably be deleted or clarified. It would seem that water sourced from Park Moabi could not be "objectionable" to a well in Park Moabi. What is the basis for this comment? Was fate and transport modeling conducted to form a basis?	The sentence in question will be revised to read: "Although pumping freshwater from Park Moabi would have negligible effects on the rate of Cr(VI) remediation, there are two potential problems: 1) pumping more than about 60 gpm from a well or wells at Park Moabi poses a risk of upconing of high TDS water from depth and degrading water quality in the existing wells and 2) if high TDS water were pumped from Park Moabi and injected into the freshwater wells, it could be drawn back to the park over the course of the remedial action and degrade the water quality in the existing wells. (see Appendix J for further details)"	Comment resolved.			Comment resolved.	90% BOD Exhibit 3.3-1.
148	DTSC-52	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Exhibit 3.3-1, Page 3-27	At the time of this writing, PG&E has conducted a longer-term constant-rate extraction test at HNWR-1 well to confirm the well capacity to meet the need of the remedy and other needs; results from this test will be presented when available.	Please include the date of the long term extraction test.	The long term extraction test was cancelled on short notice shortly after the 60% BOD was submitted because Southwest Water needed to postpone the shut down and monitoring of water levels in Topock-2/3, until a later time. PG&E plans to conduct this test as part of the FWIP, and summarized/ referenced in the 90% BOD.	DTSC concurs that the results from this test will need to be presented or summarized and referenced in the 90% BOD.			Comment resolved.	90% BOD Exhibit 3.3-1.
149	DOI-64	Exhibit 3.3-1, Page 3-29, 4. Implement-ability Considerations	"All new conditioning facilities or an arsenic treatment facility will require electricity and strong chemicals . . . "	What chemicals would be used that are classified as "strong"?	Strong chemicals would include oxidizing agent (e.g., calcium hypochlorite) and acids (e.g., sulfuric or hydrochloric acid). For arsenic/fluoride removal, a caustic (e.g., sodium hydroxide) would also be used. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Exhibit 3.3-1.
150	DOI-65	Exhibit 3.3-2,	Possible Operational	The table indicates that well replacement may be a possible	In general, over drilling or replacement are both possibilities for		Comment resolved.		Comment resolved.	Not applicable

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		Page 3-31	Actions for Potential Problem – Well yield declines below the minimum required for optimal remedy operation	action. It is presumed that either over-drilling of the current HNWR-1 well site or re-drilling adjacent to the current site are both possible considerations for well replacement?	replacing wells that are no longer performing as design. In the case of HNWR-1, the screen is set inside the well casing and not welded or otherwise attached, so it could not be easily removed for over-drilling. If the screen couldn't be removed, it would likely be necessary to abandon HNWR-1 and drill a replacement well nearby.					
151	DTSC-53	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Exhibit 3.3-2, Page 3-31		Suggest adding increasing river bank extraction to the Possible Operational Actions column on this table.	Increasing river bank extraction results in increased velocity across the IRZ line and across the floodplain. Increased groundwater flow velocity can potentially result in incomplete treatment of chromium in the IRZ and insufficient time for byproducts to dissipate between the IRZ and the river bank wells. This option will be added to the table, with the caveat that it could only be used to offset a marginal reduction in freshwater supply. The nominal aggregate riverbank well extraction rate of 150 gpm was the ideal rate for the remedial system design based on the groundwater flow and solute transport modeling. Sensitivity analyses conducted at a rate of 300 gpm riverbank extraction (Appendix B Section 10.3) indicates that small fingers of Cr(VI) progress past the NTH IRZ during the 18 month NTH IRZ off-cycle, although they are attenuated during the next 6-month NTH IRZ on-cycle. Additional steps such as increase NTH IRZ operational rates, activation of provisional NTH IRZ wells, reduction in the NTH IRZ off-cycle duration, or an increase in TOC injection concentrations can also be used to address potential Cr(VI) breakthrough along the NTH IRZ. Due to the limited amount of hydrogeologic data in the northern part of the floodplain where the aquifer thickens, flexibility was added into the riverbank extraction well design to allow for greater total extraction rates than the model currently projects would be optimal. An aggregate riverbank extraction rate of 500 gpm was estimated as a	Table 3.2-2 indicates that nominal river back extraction rates are 150 gpm. Maximum rates are stated to be a combined 500 gpm. This also relates to comment #839 DTSC-252. Is 500 gpm an excessive groundwater flow velocity? Is 500 gpm a realistic rate? If not, what is realistic? DTSC agrees with PG&E with respect to the risk associated with high extraction rates. This is one of the reasons that DTSC has requested additional contingency river bank extraction wells to manage possible breakthroughs or excess by-product generation. DTSC also agrees that extraction velocity adjustments would be an essential contingency measure for the remedy as well. Comment resolved.			Comment resolved.	90% BOD Exhibit 3.3-2. O&M Manual Volume 3 Table 2.3-1.

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					reasonable maximum for the riverbank extraction wells in order to accommodate the potential for higher than expected transmissivity along the river bank. A model run was not conducted at a 500 gpm riverbank extraction rate. If the transmissivity along the river bank is higher than expected, the hydraulic influence of the river bank wells on the IRZ would be lessened and pumping rates from the river bank wells would need to be increased above the rates currently projected by the model to maintain hydraulic control. The groundwater flow and solute transport model will be updated based on data obtained during well installation and operation which will allow for the riverbank extraction well pumping rates to be refined.					
152	DTSC-54	Exhibit 3.3-2, Contingency Matrix for potential problems with HNWR-1	Well yield declines below the minimum required for optimal remedy operation Third bullet: Establish institutional control to prevent excessive drawdown from competing water users.	Possible contingency measures did not include the tie in of Topock 2 and 3 for added quantity of known quality water. Instead of seeking new well immediately, PG&E should design the system to allow Topock 2 and 3 water to be blended with HNWR-1. DTSC would not have jurisdiction in Arizona to limit or restrict water usage from users outside of PG&E's area of contamination. Restrictions may be within the jurisdiction of the Federal land owner or under jurisdiction of the Arizona state agencies. Furthermore, as a condition of approval, DTSC specified in the certified EIR that PG&E's remedy cannot interfere with existing water usage.	As discussed in response to comment #168 DTSC-63, PG&E will separate the freshwater supply and storage for the remedy and the Compressor Station. Topock-2/3 wells will continue to supply water for Compressor Station use via the existing 6-inch pipeline. Because of this separation of freshwater storage, the tie-in of Topock-2 and 3 wells will be eliminated in the 90% design. A tee and a valve will be added to the new 10,000-gallon freshwater storage tank for the remedy to allow for the flexibility of adding water from the TCS storage tanks as needed. Comment noted. As directed, PG&E fully intends to demonstrate compliance with EIR mitigation measure WATER-1, which is to proactively identify and mitigate potentially significant effects on local groundwater levels associated with proposed freshwater extraction wells. In addition, as directed, PG&E will also implement institutional controls (ICs) to protect the integrity and the effectiveness of the remedy in the short-term and long-term. To this end, PG&E is evaluating the need for and/or the scope of an IC at or near the HNWR-1 well to ensure adequate quantity of fresh water for	Okay.			Comment resolved.	90% BOD Figures 3.3-1, 3.5-1, and 3.5-3.

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					remedy effectiveness (see Note 3 on Figure 5.1-1, page 211 of the PDF). In the event an IC is determined to be needed, PG&E will work with the appropriate agencies, land manager, and land owner to obtain the necessary IC.					
153	DTSC-55	Exhibit 3.3-2, Quality of water in freshwater well declines over time		DTSC has required PG&E to design the water treatment system so that it would be a contingency in event water quality would impact PG&E's ability to continue operation of the remedy. Construct and operate the water treatment system should be listed as a contingency.	PG&E complied with DTSC's direction in its December 31, 2012 letter and included a freshwater pre-injection treatment system in the 60% design. Therefore, the water treatment system was not a contingency in the 60% BOD. As discussed in response to comment #21 DTSC-2, PG&E will include a freshwater pre-injection treatment for arsenic only in the 90% and final designs as a contingency.	Comment resolved pending review of the 90%. Please ensure freshwater pre-injection treatment for arsenic is listed in Exhibit 3.3-2.			Comment resolved.	O&M Manual Volume 3.
154	DOI-66	Section 3.3.2, Page 3-32	"Most of the water produced by HNWR-1 is expected to come from the Colorado River . . . "	Several concerns were identified in Exhibit 3.3-1 regarding use of the Colorado River as a source of fresh water. These included susceptibility to future contamination, and the possibility of the presence and potential need to address emerging contaminants. Further describe how these concerns do not carry over to the use of wells located near Sacramento Wash/Topock Marsh.	Wells near the river do not pump river water directly. Groundwater travel time from the river to a well located at the distance of HNWR-1 well is likely many months to a few years. Depending on the transport properties some contaminants move much slower than the water. All contaminants are subject to dispersion and dilution between the river and a well. So if a contaminant is found in the river, there is ample time to stop pumping or institute additional monitoring before it shows up in a well near the river, and the concentration of the contaminant in the well is likely to be considerably less than in the river. Discussion of this will be made clearer in the text.		Comment resolved pending review of text addition.		Comment resolved.	90% BOD Section 3.3.2. O&M Manual Volume 2 Section 5.2.2.
155	DOI-67	Section 3.3.2, Page 3-32	"Most of the water produced by HNWR-1 is expected to come from the Colorado River . . . "	The in-text citation for ADEQ 2001 is not listed in the Reference section.	The following item will be listed in the Reference under ADEQ -- *"ADEQ. 2001. Ambient Groundwater Quality of the Sacramento Valley Basis: A 1999 Baseline Study."*		Comment resolved.		Comment resolved.	90% BOD Section 9.
156	DTSC-56	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Source Water	This radius extends to within 500 feet of the EPNG Mojave Topock Compressor Station in	The text and Exhibit 3.3-3 should disclose the locations of existing water wells in the vicinity of HNWR-1. Based on the radius of influence pictured in Exhibit 3.3-3, this should include, at a minimum, the following wells: Old Southwest Gas, MTS-1,	The Old Southwest Gas well is likely one of the former wells at the site where Topock 2 and 3 currently exist. At least three wells have been drilled at this location and only two exist today. Southwest Gas was the owner when these wells were drilled.	Comment resolved.			Comment resolved.	90% BOD Section 3.3.2. O&M Manual Volume 2 Section 5.2.2. O&M Manual Volume 2 Exhibit 5.2-1.

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		Assessment, Page 3-32, Paragraph 1 and Exhibit 3.3-3	Arizona and encompasses the Topock Marina area (see Exhibit 3.3-3). As shown in Exhibit 3.3-3, the majority of the property in this radius is undeveloped…	MTS-2, Sanders, Smith, PGE-9N, PGE-9S, New Topock Marina well, and monitoring wells MW-54 cluster, MW-55 cluster, and MW-56 cluster. Please also consider including Serrano and GSRV-2 especially if Site B were to be utilized instead of HNWR-1. Please clarify if any of these wells have been appropriately decommissioned and no longer exist at the surface. The source water assessment should focus on the developed areas that may have water impacts associated with them. Some research into the various waste ponds at the EPNG Mohave Compressor Station should be conducted and summarized in this section. Groundwater monitoring parameters should be selected and included in remedy monitoring that would be related to or unique to EPNG operations. Installation of monitoring wells associated with the waste ponds may be prudent. Summary of the monitoring well data related to former USTs at Topock Marina should be cited. Former Topock shops/gas stations (e.g., old garages) should be considered and appropriate monitoring parameters and monitoring wells should be selected and incorporated into the remedy.	Hand drawn sketches on some of the well records show an abandoned well between Topock 2 and 3. As far as PG&E knows, all of the other wells listed are still in existence and the figure will be modified to show them. Based on information in the ADEQ Topock Groundwater Study report, the ponds at the Mohave Topock Station were constructed in 2005 and are permitted units with leak detection systems. The ponds receive non-contact cooling water that was formerly directly discharged to the river. There is no reason to suspect that these recently constructed, RCRA permitted facilities receiving non-hazardous cooling water should represent a threat to water quality or require additional monitoring to be installed by PG&E. PG&E will request information from ADEQ regarding the former USTs at the Topock Marina. The UST site was closed by ADEQ, so it is not anticipated that it would continue to be a threat to groundwater quality in the HNWR well, which is over 2,000 feet away. The MW-55 cluster is located less than 100 feet from the former UST and directly between the UST and HNWR-1, so it should provide an adequate monitoring location to address this concern, or the concern about unknown historic sources in the Topock area. Additional information obtained will be summarized in the 90% design.					
157	DOI-68	Section 3.3.2, Page 3-32	"This dump consists of small area of rusty cans and other metal debris scattered on the land surface. . . . It is located adjacent to a flat area that may have housed a military or work crew	Is there any information about the dump area? Has any testing been done? Could this site represent a potential source for the elevated arsenic found in HNWR-1?	There is no information about the dump area and it does not appear to PG&E or DTSC to be a threat to groundwater. The text will be revised as follows (inserted verbiage shown in underline typeface, deleted verbiage shown in ~~strikethrough~~ typeface): "This area ~~dump~~ consists of ~~small area of~~ rusty cans and other metal debris scattered on the land surface…"		Comment resolved.		Comment resolved.	90% BOD Section 3.3.2. O&M Manual Volume 2 Section 5.2.2.

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			encampment.”							
158	DTSC-57	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Source Water Assessment, Page 3-32	Also within this radius is a former dump area which DTSC expressed concern about.	As existing DTSC representatives had no knowledge of the former dump site cited, the reference to DTSC should be deleted. After reviewing this item, DTSC visited the cited area in Arizona and it did not appear to be a significant threat to groundwater resources (Does PG&E believe it is a threat?). It is uncertain why it is being discussed in the document. DTSC is interested in any historical knowledge PG&E may have of this area. Please clarify.	The cited text and the rest of the paragraph will be deleted. The following text will be inserted in its place: “A question was raised in a public meeting about a rumored former “Topock Dump” that reportedly contained trash from local residents. PG&E was not aware of any such former dump. A member of the FMIT who has lived in the area for many years indicated that the area of debris and can scatter was the only “dump” that he knew of in the area and speculated that it might have been trash left from a railroad work camp. PG&E agrees that this debris does not appear to represent a threat to groundwater.” Because this area does not appear to be a dump, Exhibit 3.3-3 will be revised to describe it as a “debris area” rather than a dump. In addition, the word “dump” at the end of the next paragraph will be replaced with “EPNG Mojave Topock Compressor Station”.	Comment resolved pending review of replacement language in 90% BOD.			Comment resolved.	90% BOD Section 3.3.2; original text retained (but revised) to reconcile with RTC#157 DOI-68
159	DTSC-58	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Source Water Assessment, Page 3-32, Paragraph 2 and 3.	Most of the water produced by HNWR-1 is expected to come from the Colorado River (via its partial diversion into Topock Marsh), although some will be derived from groundwater flowing down from the Sacramento Valley to the east (CH2M HILL 2012d). There are currently no monitoring wells in Sacramento Wash. The property	Include the basis for this statement regarding most of the groundwater coming from the river. What do stable isotope data from HNWR-1 tell us? Was modeling utilized to arrive at this conclusion? Is there enough (any) hydraulic conductivity data to make this statement? A simple assessment of the pictured 5-year radius of influence in Exhibit 3.3-3 suggests that half to a third of the groundwater might come from the east/northeast and not be sourced from the river (especially if you consider three dimensional flow). Geologic channels in the Sacramento Wash could alter this simple assessment. Please revise the statement to best relate to site conditions. Please also revise the monitoring well installation conclusion (See DTSC comment on 3.3.2 Evaluation of Freshwater Supply Sources/Selection of Preferred Source, Source Water Assessment, Page 3-32 Paragraph 1	The first sentence will be revised to read “Water produced by HNWR-1 is expected to be a mix of water recharged from the Colorado River and groundwater flowing down from the Sacramento Valley to the east (CH2M HILL 2012d).” Considering the close proximity of the well to the river and the larger volume of water available from river recharge, it is reasonable to assume that a large fraction of the water would come from the river, but there is currently insufficient data about the aquifer in the vicinity of HNWR-1 to quantify the relative fractions of water that would come from the river vs. from Sacramento Wash recharge. To be consistent, the first sentence in the next paragraph will also be revised as follows: “…~~the majority~~ a component of the water produced from HNWR-1 should originate from the Colorado River …”. Based on three available samples of	Comment resolved.			Comment resolved.	90% BOD Section 3.3.2. O&M Manual Volume 2 Section 5.2.2.

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			upstream in Sacramento Wash is undeveloped for miles… Considering the lack of existing contaminant sources in the Sacramento Valley (Exhibit 3.3-3), the installation of monitoring wells in Sacramento Wash upstream of HNWR-1 for source water protection is not considered warranted…..	and Exhibit 3.3-3 above).	stable isotopes, the average concentrations of oxygen18 and deuterium in HNWR-1 are -10.2 per mil and -75.4 per mil respectively. This water plots in near the center of the “Isotopic Non-Industrial Signature” group shown on Figure 5-24a in Volume 2 of the RFI, and indicates an intermediate signature between the river and another signature represented by the ground water coming down Sacramento Wash. If HNWR-1 is pumped continuously, the isotopic signature could begin to shift as more river water is drawn into the well. This effect has been noted in response to IM-3 pumping, which has resulted in an increasing percentage of river water with time in wells near PE-1 (see Figure 6-21 in RFI Volume 2). See response to comment #160 DTSC-59 regarding the need for monitoring wells around the freshwater well.					
160	DTSC-59	Section 3.3.2, p.3-32, 2nd paragraph	Considering the lack of existing contaminant sources in the Sacramento Valley (Exhibit 3.3-3), the installation of monitoring wells in Sacramento Wash upstream of HNWR-1 for source water protection is not considered warranted.	DTSC disagrees with PG&E’s conclusion. DTSC believes that it would be prudent to understand the incoming water quality up gradient of the freshwater well over time to ensure that quality will meet the injection objective prior to detection at the production well. Advance knowledge will allow proper planning before issue arises at the well. Furthermore, because the area of draw down encompasses many potential users, it is also necessary to monitor possible changes in water quality conditions prior to impacts of nearby wells. DTSC requests that PG&E provide a robust monitoring system up gradient and down gradient of the fresh water well.	Even in areas where groundwater is a primary source of drinking water and potential contaminant sources are numerous (such as Phoenix, Tucson, and the San Fernando Valley) installation of monitor wells for an early warning system around a new production well is not a typical requirement. CH2M HILL is unaware of any municipality that is required to provide this level of monitoring for wells that are remote from any known sources of contaminants and directly serve water to their customers. In addition, the predictive value of data from a monitoring well at a distance from a pumping well is limited. In a radial converging flow field around a pumping well, any single monitor well represents only a small fraction of the total circle from which the flow converge at the pumping well. The concentration in a continuously pumped well represents an integrated sample of water coming inward to the well from all directions. Due to dilution in the radial flow field, the concentration in the pumped well could be much less than in a	In an effort to minimize additional well installations, it is proposed that existing wells be utilized to provide groundwater data that may provide value for source water protection. As the only known potential source of anthropogenic contamination in the vicinity would be from the Mohave Topock Station waste ponds, periodic analysis of Topock 2/3 well data should be included in the remedy operation and added to the 90% design. Wells Topock 2/3 are located between HNWR-1 and the Mohave Topock Station and capture water from a significant distance as compared to a dedicated monitoring well.			Comment resolved. PG&E will include periodic sampling of Topock-2/3 wells in the 90% assuming that the well owner will allow sampling of the wells.	90% BOD Section 3.3.2 (3rd paragraph from the bottom, last sentence). O&M Manual Volume 2, Section 5.2.2 (5th full paragraph, last sentence) PG&E will provide Topock-2 and 3 water quality data collected for water supply purposes as PG&E receives the information from Southwest Water.

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					monitoring well located even a few hundred feet away. For a monitoring network to be able to accurately predict future concentrations in a pumped well, monitoring wells would need to be spaced sufficiently close so that they could begin to represent the average water quality coming into the pumped well from all directions. The number of wells required to accomplish this goes up geometrically with the distance from the pumped well. Using the equations provided for travel time to the well in Section 3.3.2, a robust monitoring network located far enough from the pumped well to provide reasonable early warning, (say a years' travel time), would need to monitor a circumference of about 7,500 feet. So even with relatively wide spacing of 1,000 feet between wells, this would require 7 new monitor wells. To dedicate this many monitoring wells for the purpose of monitoring a supply well that does not serve customers directly and is located in a relatively undeveloped area seems excessive and unwarranted, particularly in light of the need to control the total well count at the Topock site.					
161	DTSC-60	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Source Water Assessment, Page 3-32, Paragraph 3.	The travel time of constituents in river water to a nearby well may take many years, depending on their mobility (CH2M HILL 2012d); therefore, river water quality is a good indicator and should be used for source water protection of HNWR-1.	It is requested that existing well locations (e.g., MW-54/55/56) be considered for periodic monitoring of river constituents/ source protection. Also clarify that the freshwater supply well will be periodically monitored for potential river contaminants.	The primary monitoring strategy for detecting contaminants in the river is to rely on samples of river water. Samples of wells near the river provide at best a diluted sample of what is in the river. Recharge to HNWR-1 is much more likely to come from the nearby Topock Marsh than from the main river channel, where MW-54 and MW-56 wells are located. There is continuous interchange of water in the marsh with the river, so there is no reason to expect a contaminant in the river would not be present in the marsh, or vice-versa. The MW-54 and 56 well clusters are outside the projected 5 year travel time from HNWR-1, so monitoring at these locations is of questionable value to predicting water quality changes in HNWR-1. The MW-55 cluster is between the Topock Marina and HNWR-1, PG&E agrees that	Comment resolved.			Comment resolved.	O&M Manual Volume 2 Section 5.2.2 (last paragraph) and Table 5.2-5.

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					monitoring at this location could have some value in detecting contaminants originating from any sources in the small developed area around the marina and it will be included in the monitoring program. The proposed monitoring program for freshwater supply well(s) is provided in Exhibit 5.2-2 of the O&M Manual, Volume 2 (page 5-4) and includes constituents such as pesticides and herbicides that are more commonly found in surface water than in groundwater and may be present in the river.					
162	DTSC-61	3.3.2 Evaluation of Freshwater Supply Sources/ Selection of Preferred Source, Source Water Assessment, Page 3-32, Paragraph 3.	The river in the immediate vicinity of the site and downstream is monitored by the Metropolitan Water District of Southern California (MWD).	Please include the MWD monitoring stations on a figure so all will know where sampling is conducted with respect to the PG&E site and that it is appropriate.	PG&E received permission from MWD to include its monitoring stations on a figure in the Topock design report. Therefore, PG&E will include MWD monitoring stations in Figure 2.4-7 (Surface Water Monitoring Locations) in the 90% BOD.	Okay			Comment resolved.	90% BOD Figure 2.4-7.
163	CRB-1	Section 3.3.2, p. 3-37	*"most of the water produced by HNWR-1 is expected to come from the Colorado River (via its partial diversion into Topock Marsh), although some will be derived from groundwater flowing down from the Sacramento Valley to the east"*	The Board expects any new well to be drilled in compliance with state and federal laws. Although the draft BOD report indicates PG&E's intention to maximize re-injection of treated remedy-produced water to the groundwater basin and minimize consumptive use for the remediation project, any consumptive use at the project should be documented. The Board requests that PG&E document water usage information that includes the amount of water diverted and re-injected to groundwater at the remediation project site.	PG&E plans to document groundwater usage and has equipped extraction and injection wells with flowmeters and totalizers as shown on the P&ID drawings. Under the terms of its water right, PG&E will continue to report quantities of water pumped and injected during the operation of the remedy to the City of Needles, as administering agency for the Lower Colorado River Water Supply Project (LCWSP) water for non-federal entities (FEIR at page 4.12-1).					90% BOD Appendix D Drawings (e.g., E-02-01, I-01-01, M-01-01, etc.)
164	DOI-69	Exhibit 3.3-4, Page 3-34		At what depth would each well be set in order to achieve the design gpm flow rate? Does PG&E have specific capacity information for each location?	Tables 3.2-1 and 3.2-2 provide additional information on well depths and screen lengths. The exact depths and design of each well will be determined based on geology encountered at the time of drilling. Specific capacity data is only available at a few existing wells at the site. A footnote will be added to indicate that the well will be tested	What is PG&E's process that would hopefully minimize additional drilling? Comment resolved pending review of the 90% design.	Comment resolved pending review of the 90% design.		Comment resolved.	90% BOD Table 3.3-1 (Footnote b). Construction/Remedial Action Work Plan Sections 3.1 and 3.2 for well construction approach and sequencing.

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					to ascertain specific capacity for injectivity. Text will be added to reference the O&M plan discussion on the well construction process.					
165	DTSC-62	3.3.3 Design Basis for Freshwater Supply System, Page 3-34.	Extraction well or well(s) in Arizona (HNWR-1 well is the primary freshwater supply well, freshwater can be augmented with water from current TCS supply wells [Topock-2/3] if needed)	DTSC concurs that the remedy freshwater supply should not be unnecessarily burdened by Compressor Station needs unrelated to the project. Potentially utilizing Topock 2/3 wells is necessary and appropriate.	Comment noted.	Response noted.			Comment resolved.	Not applicable
166	DOI-70	Exhibit 3.3-4, Page 3-35, Supply Pump	"A separate flow meter and connection for the Refuge to use."	The sentence is incomplete.	The sentence will be revised as follows: "A separate flow meter and connection <u>will be provided</u> for the Refuge to use."		Comment resolved.		Comment resolved.	90% BOD Exhibit 3.3-4.
167	DOI-71	Exhibit 3.3-4, Page 3-35	Footnote b	The information in Footnote b regarding the freshwater injection wells seems inappropriate. Suggest deleting the footnote.	Footnote b is useful because it provides a cross-reference to the well design parameter tables in Section 3. Therefore, it is suggested that footnote b be retained and revised as follows: "See Table 3.3-1 for design flows related to Freshwater Injection Wells (FWs) and Table 3.2-2 for design flows related to Inner Recirculation Wells (IRLs)."		Comment resolved.		Comment resolved.	90% BOD Exhibit 3.3-4.
168	DTSC-63	Section 3.3.3, Design Basis for Freshwater Supply System, p.3-35	To accommodate potential future operational changes associated with the remedy while maximizing the use of existing facilities, the design incorporates the current freshwater supply system for the Compressor Station. The	Project demand should be first priority for the design and future operation of the freshwater source. PG&E should separate station operational needs from remedy. It is DTSC's expectation that the use of all infrastructure designed and constructed under DTSC's approval would be prioritized for remedy first and not PG&E's operational needs. Furthermore, DTSC has not evaluated, in the Certified EIR, the economic impacts to water purveyor by allowing PG&E to use the same fresh water source for operational needs.	The first priority for the freshwater stored in or flow from the existing storage tanks is fire protection for the Compressor Station and current water need at the Station, and that priority cannot be changed. To ensure first priority for remedy use and after further evaluation of the additional controls, instrumentation, and tank upgrades needed to be installed in the existing tanks in order to harmonize various demand for freshwater, PG&E will separate the freshwater supply storage for the remedy and the Compressor Station. A separate and smaller tank (10,000 gallons) will be installed inside the Compressor Station for remedy use only and will be supplied by the new freshwater	Comment resolved pending review of 90% design. Since this is a new change from the 60% BOD, PG&E should keep the agencies, Tribes, and other stakeholders informed of this proposal before the 90% BOD submittal.			Comment resolved.	90% BOD Figures 3.3-1, 3.5-1, and 3.5-3. PG&E discussed the design change related to the separation of freshwater storage and the location of the new 10,000-gallon remedy freshwater water storage tank, at the June 18, 2014 TWG meeting and the July 16, 2014 CWG meeting.

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			compressor Station's current water need (approximately 110 gpm) is served by Topock-2 and -3 supply wells in Arizona; the fresh water is conveyed via a pipe crossing the Colorado River on the arch bridge.		supply source from Arizona (pending completion of the Alternative Freshwater Source Evaluation). Note that Topock-2/3 wells will continue to supply water for Compressor Station use via the existing 6-inch pipeline. The new 10,000-gallon tank is different from the proposed conditioned water storage tank and will be located near the planned Remedy-produced water conditioning plant (see proposed layout and tank specification in the technical memorandum titled "Addendum to the Freshwater Pre-injection Treatment System Design Basis", included in **Attachment F** at the end of this table). As for freshwater supply piping, PG&E will retain the existing 6-inch line to supply the Compressor Station.					
169	DOI-72	Section 3.3.3.2, Page 3-36	"Storage of fresh water is required to meet the flow demands to injection wells during extended supply well(s) shutdown and outage . . . "	How long of a shutdown can the system endure and meet flow demands before storage capacity is exhausted?	The existing freshwater storage capacity is 420,000 gallons. Per Exhibit 3.3-4, the injection flow for IRZ/FW wells ranges from 150 to 900 gpm, and the Compressor Station flow is 110 gpm, for a combined total of 260 to 1,010 gpm. At this combined flow range, the supply well(s) could be shut down for 7 hours to almost 27 hours before the storage capacity is exhausted. Note that if needed, injection flows can also be temporarily reduced to allow injection to continue for a longer time.		Comment resolved pending review of SOPs in 90% design.		Comment resolved.	This RTC is no longer applicable with the separation of freshwater storage between TCS and groundwater remedy. This essentially decouple the fire protection supply from freshwater injection. TCS will continue to supply fire protection water for groundwater remedy facilities. The new 10,000 gallon Remedy freshwater storage tank will supply the freshwater injection well FW-2. At the nominal and maximum flowrates of 50 and 100 gpm, FW-2 can be operated for 2-3 hrs with the freshwater supply well down. Note that if needed, injection flows can also be temporarily reduced to allow injection to continue for a longer time. Since the upland wells (FW-1 and certain IRL wells) receive freshwater directly from the supply well, they will not be operated if the supply well is down.
170	DOI-73	Section 3.3.3.1, Page 3-36	"After crossing the Colorado	A figure showing the water pipeline route would be useful to support the	A figure will be added in this section as requested.		Comment resolved.		Comment resolved.	90% BOD Figure 3.3-1.

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			River into California, the water pipeline . . . "	text.						
171	DOI-74	Section 3.3.3.2, Page 3-36	"An analysis of the fire protection system hydraulic performed at the 60% design stage suggested that there is adequate storage capacity to meet fire flow storage requirements that can be shared with the remedy, as long as there is sufficient supply . . . "	How long can injection wells operate during a shutdown before they are required to be shutdown to ensure ample water for fire protection?	The existing freshwater storage capacity is 420,000 gallons. Per PG&E's insurance company, the required fire flow for TCS is 900 gpm and duration is 60 minutes, which results in a total of 54,000 gallons. See also response to comment #428 FMIT-124 below for fire flow requirements for remedy facilities. If the storage tanks are completely full and the freshwater supply well(s) are down, the injection wells can be operated for 6 to 11 hours and still ensure ample water for fire protection for both TCS and remedy facilities. If a certain minimum level must be maintained in the storage tanks, the duration could be less (the control strategy will be included in 90% design). Note that if needed, injection flows can also be temporarily reduced to allow injection to continue for a longer time.		Comment resolved pending review of SOPs in 90% design.		Comment resolved.	This RTC is no longer applicable with the separation of freshwater storage between TCS and groundwater remedy. This essentially decouple the fire protection supply from freshwater injection. TCS will continue to supply fire protection water for groundwater remedy facilities. The new 10,000 gallon Remedy freshwater storage tank will supply the freshwater injection well FW-2. At the nominal and maximum flowrates of 50 and 100 gpm, FW-2 can be operated for 2-3 hrs with the freshwater supply well down. Note that if needed, injection flows can also be temporarily reduced to allow injection to continue for a longer time. Since the upland wells (FW-1 and certain IRL wells) receive freshwater directly from the supply well, they will not be operated if the supply well is down.
172	DTSC-64	3.3.3.1 Freshwater Supply Piping Network, Page 3-36, Paragraph 2 and 3.		For clarity, please indicate if the existing pipeline from Topock 2-3 will be removed along any of its existing length.	The entire length of the existing pipeline carrying water from Topock-2/3 is included in the 60% design. Final configuration of the pipeline including any modifications for remedy use will be included in the 90% design submittal.	Comment resolved pending review of the 90% BOD.			Comment resolved.	At this 90% design stage, the existing 6-inch freshwater pipeline from Topock-2 and 3 to TCS storage tanks will remain. See 90% BOD Exhibit 3.3-1, Evaluation Criteria #2, 3rd paragraph for additional details.
173	DTSC-65	3.3.3.1 Freshwater Supply Piping Network, Page 3-36, Paragraph 4.		Indicate if the freshwater piping, other buried piping, or other remedy components will require cathodic protection for protection against corrosive soils. Is so, please discuss and include the design. Suggest indicating the composition of the piping in these sections (believe it's all plastic underground after review of Appendix L, Volume 1, Section 5).	At the 60% design stage, the material of construction for belowground water pipes is plastic (HDPE), and for aboveground water pipes is steel (Schedule 40 steel with AWWA C205 cement mortar lining) or plastic (HDPE or CPVC). Steel pipe will have an exterior coating to prevent external corrosion. Based upon this design approach, no cathodic protection is required.	Okay, pending final material specification, including the composition of the exterior coating for the pipes.			Comment resolved.	90% BOD Exhibit 3.3-4 (Item: Water Pipe).
174	DTSC-66	3.3.3.2 Freshwater	…sharing of existing	It is not clear why this statement is needed. From a supply standpoint,	This statement will be deleted as requested.	Okay.			Comment resolved.	90% BOD Section 3.3.3.

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		Supply Storage, Page 3-36	Compressor Station facilities dictates that the needs of the Compressor Station will supersede freshwater injection requirements.	the Compressor Station can always utilize existing Topock 2-3 supply wells. It is requested that this statement be deleted as supply for the station can be augmented with proven, exiting resources.						
175	DOI-75	Section 3.3.3.3, Page 3-37, Technology Selection/Ongoing Bench Scale Testing	"The initial list of technologies evaluated for freshwater pre-injection treatment . . . "	To state that the initial screening was based on the experience of the engineering team with the technologies downplays what was actually performed – an analysis of cost, waste generation quantities, and performance uncertainty. Suggest the insertion of different language here and in Appendix M.	The reference text is accurate. The technology screening was done in two steps – the first step was to brainstorm the technologies based on the engineering team's experience, and the second step was to evaluate the technologies based on treatment effectiveness, reliability and flexibility, operational complexity, waste generation, footprint, and cost-effectiveness. PG&E welcomes suggestions on text to make this point clearer.		Resolved.		Comment resolved.	Not applicable.
176	DTSC-67	3.3.3.3 Freshwater Pre-Injection Treatment System (FWPTS), Page 3-37	…this design includes a FWPTS for the removal of arsenic and fluoride to conservative treatment goals—specifically, the arsenic treatment goal is to achieve concentrations below the federal/state MCL of 10 µg/L, and the fluoride treatment goal is concentrations below the state MCL of 2 mg/L.	A separate "arsenic only" treatment design should also be included as it is more likely that arsenic treatment would be needed as per State/Water Board directive or as a contingency in the future. Attaining a goal of 2 mg/L for fluoride is futile as higher concentrations already exist in the area where fresh water will be injected. Please revise.	Section 3.3.3.3 text in the 90% BOD will be revised to reflect an arsenic only treatment system as a contingency per the State Board letter. Reference to fluoride treatment will be removed in the 90% BOD.	Comment resolved pending review of the 90%.			Comment resolved.	90% BOD Section 3.3.3.4. O&M Manual Volume 3.
177	DTSC-68	3.3.3.3 Freshwater Pre-Injection Treatment System (FWPTS),	As a result of this evaluation and screening process, AA was selected for bench scale	Would the same treatment technology be proposed if arsenic, and not fluoride, were to be treated? In other location within the 60% design, PG&E appear to suggest that a different technology would be	DTSC is correct that a different technology would be proposed for arsenic treatment only. Based on bench scale testing, PG&E proposes granular ferric hydroxide (GFH) as the adsorption media. PG&E will	Comment resolved pending review of the 90%.			Comment resolved.	90% BOD Section 3.3.3.4. O&M Manual Volume 3.

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		Technology Selection/Ongoing Bench Scale Testing, Page 3-37	testing; AA works similarly to ion exchange by exchanging hydroxide ions with arsenic and fluoride on the surface of an adsorptive media.	utilized for treat arsenic alone. This important issue must be addressed as it is less likely that fluoride treatment will be needed. Other reasonable methods for treating arsenic only should be considered and, if appropriate, additional detailed designs should be prepared. Minimizing building footprint and waste volumes are logical criteria to assess the treatment technologies for this site. At a minimum, an arsenic only treatment system should be carried forward into final design as a contingency measure even if the State Board does not require treatment. This will minimize lengthy delay to the cleanup should treatment become necessary in the future.	include a freshwater pre-injection treatment for arsenic only in the 90% and final designs as a contingency.					
178	DTSC-69	Section 3.3.3.3, Ongoing bench scale testing, p.3-37 to 38	As discussed at the January 16, 2013 CWG and January 17, 2013 TWG meetings, the bench scale test is being conducted using HNWR-1 water at an offsite laboratory, CH2M HILL's Applied Science Laboratory… The bench scale testing is currently ongoing to verify the effectiveness of various optimization techniques to better under [stand] waste quantity/ quality, reduce waste generation, and chemical use (see below for additional details).	When will these bench scale tests be complete and results shared with stakeholders? What parameters and testing methods are being employed as part of these tests? Where is the test proposal or work plan? PG&E should disclose these tests being conducted as part of the remedy evaluation.	A summary of the test plan was included in the 60% design, Section 4 of Appendix M (Freshwater Pre-Injection Treatment System Design Basis Tech Memo). The bench scale tests are now complete. See attached technical memorandum that summarizes the bench scale test results for arsenic only treatment and the design basis for a corresponding FWPTS. For clarity in the 90% BOD, the attached memo (see **Attachment F** at the end of this table) will replace the As-F memo previously presented in Appendix M of the 60% BOD.	Comment resolved pending review of the new Appendix M submittal/90% design.			Comment resolved.	90% BOD Appendix M.

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179	DOI-76	Section 3.3.3.3, Page 3-38, Process Description		Please add a discussion of solids management (expected quantities, characteristics, handling, and disposition) to the section. Also, add information regarding solids management to Exhibits 3.3-5 and 3.3-6.	A discussion of solids management will be added to this section in the 90% BOD. As stated in response to comment #176 DTSC-67, Section 3.3.3.3 text in the 90% BOD will be revised to reflect an arsenic only treatment design as a contingency.		Resolved pending review of the 90% design.		Comment resolved.	90% BOD Section 3.3.3.4, last paragraph, last sentence. O&M Manual Volume 3, Appendix B, Section 5.2 (page 5, Wastewater and Solid Waste Generation).
180	DOI-77	Section 3.3.3.3, Page 3-38, Process Description	"This information will provide further clarification on the waste quantities and qualities . . . "	The chance of using the option to reinject regeneration wastewater into the IRZ seems remote, since it will contain elevated arsenic, fluoride, and salts relative to the untreated freshwater. Suggest deleting this option.	As directed by DTSC, PG&E will design an arsenic only freshwater pre-injection treatment system and this will be included in the 90% design as a contingency. Based on bench scale testing, PG&E proposes granular ferric hydroxide (GFH) as the adsorption media. This media is disposable and does not require regeneration. The cited text will be revised as follows in the 90% BOD: "<u>The majority (approx. 95%) of the backwash water generated will be recycled in the freshwater pre-injection treatment system leaving only about five percent of the backwash stream needing to be managed (this stream is not expected to have elevated As concentrations). The management options for backwash water include reuse in the cooling towers, discharge to the evaporation ponds, and/or truck to off-site permitted disposal facilities.</u>"		Comment resolved.		Comment resolved.	90% BOD Exhibit 3.4-3 (Footnote).
181	DTSC-70	3.3.3.3/3-38	Process Description	The proposed use of wastewater in the cooling tower or reinjection in the in situ reactive zone wells may present challenges in obtaining the quantity and quality diverted. Please provide specific water quality parameters required and viability for the proposed reuse of each said reuse.	Regarding water quality parameters required for reuse of wastewater in the cooling towers, NALCO (PG&E's current contractor for cooling tower chemistry) will review and sign off on any influent water prior to its use in the cooling towers. The Topock remediation team has and will continue to engage NALCO in the proposed reuse of conditioned remedy-produced water in the TCS cooling towers. At this time, this reuse option remains viable and will be carried forward into the 90% design. Regarding water quality parameters required for reinjection into the IRZ wells, PG&E understands that the comment pertains to requirements for protection of the IRZ wells from fouling. To that end, PG&E prepared a technical memorandum titled "Summary of IRZ Well Fouling at	DTSC understands that the water quality acceptable for use at the cooling towers rests solely upon PG&E and to some extent the RWQCB for the discharge water to the existing ponds. DTSC's objective is to ensure the protection of the water basin receiving the reused wastewater and that PG&E is operating in a manner that would safeguard the future use of the beneficial use aquifer. Although DTSC remains cautious due to injection well fouling issues experienced at Hinkley. DTSC will, however, withhold any further comments based on PG&E's assurance that they have thorough understanding of the chemistry associated with injection well design as			Comment resolved.	Not applicable

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					Hinkley as it Relates to Re-Injection of Remedy Produced Water into IRZ Injection Wells at Topock" (included in **Attachment P** at the end of this RTC table). This technical memorandum summarizes IRZ well fouling experience at Hinkley and confirms that based on operational information collected to date at Hinkley, the effluent water quality requirements specified for conditioned remedy produced water at Topock are adequate and are protective against fouling of IRZ wells (see Exhibit 3.4-5 of the 60% BOD). This will be confirmed during remedy operation by the proposed sampling program for the influent and effluent of the conditioning system (see Exhibit 5.3-2 of O&M Manual Volume 2, Sampling and Monitoring Program). With the proposed protections, reinjection of conditioned remedy-produced water into the IRZ wells continues to remain viable and will be carried forward into the 90% design.	well as pending complete review of the compliance monitoring plan to be submitted with the 90% design.				
182	DOI-78	Exhibit 3.3-5, Page 3-39		From the Compressor Station Freshwater Storage Tanks, what percent of the water will be used for Compressor Station Use and what percent of the water will be directed to the pre-treatment system?	See response to comment #168 DTSC-63. Exhibit 3.3-5 will be revised to separate the freshwater supply storage for the remedy and the Compressor Station.		Resolved pending review of the 90% design.		Comment resolved.	90% BOD Exhibit 3.3-4 (see Freshwater Storage Capacity).
183	DTSC-71	Exhibit 3.3-5	To IRZ Wells from Backwash Tanks	Under what circumstance and chemical conditions can the backwash water be used in the IRZ wells? Although the remedy is operating under the CERCLA exemption from Waste Discharge Requirements, DOI as the administrating agency of the exemption must understand the substantive requirements for injecting the waste water stream into the ground. DTSC recommends PG&E and DOI to consult with the RWQCB to identify and include in the report. Alternatively, PG&E should consider removing injection of backwash water into the IRZ as a waste water management option.	Exhibit 3.3-5 will be revised to reflect an arsenic only pre-injection treatment system. The arsenic removal process is highly efficient enabling a high recycling rate (about 95%) of the backwash water, therefore, the volume of wastewater needing to be managed will be minimal. This volume of wastewater can be accommodated using management options such as cooling towers, TCS evaporation ponds and/or offsite permitted facilities. Therefore, the option of injecting backwash water (from freshwater pre-injection treatment) into the IRZ will not be necessary and therefore, will be removed.	Comment resolved pending review of the 90%.			Comment resolved.	90% BOD Exhibit 3.4-3 (see Footnote).
184	DTSC-72	Exhibit 3.3-5/3-39	Pre-injection Treatment Process Schematic	Please introduce pre-treatment chemical after the filters to save on overall dosage quantity as well as filter longevity.	Injecting pre-treatment chemicals such as hypochlorite upstream of the filters offers two benefits – first, any solids formed during the	Okay.			Comment resolved.	Not applicable.

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Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design

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					hypochlorite mixing will be captured by the filters and second, any bacterial growth on the filter cartridges will be prevented.					
185	DTSC-73	Exhibit 3.3-5/3-39	Pre-injection Treatment Process Schematic	Please introduce pre-treatment chemical after the filters to save on overall dosage quantity as well as filter longevity.	The comment appears to be identical to comment #184 DTSC-72. See response to comment #184 DTSC-72.	Okay.			Comment resolved.	Not applicable.
186	DTSC-74	Exhibit 3.3-6/3-40	Freshwater Pre-Injection Treatment Design Criteria	Please use the operation pH range from 6 as mentioned in Section 3.3.3.3 page 3-38 in the process description for consistency.	The freshwater pre-injection treatment design criteria will be revised to reflect an arsenic only treatment system. The proposed use of disposable granular ferric hydroxide (GFH) as the adsorption media for arsenic removal does not require media regeneration, therefore, it will not need a neutralization step. As stated in response to comment #176 DTSC-67, Section 3.3.3.3 text in the 90% BOD will be revised to reflect an arsenic only treatment design as a contingency.	Comment resolved pending review of the 90%.			Comment resolved.	90% BOD Section 3.3.3.4.
187	DOI-79	Section 3.3.3.4, Page 3-41		This section does not contain a discussion of the rationale for well placement and the absence of provisional wells. Please add this discussion.	A sentence will be added to indicate that the injection wells were located based on groundwater model results and site surveys to locate suitable sites for drilling.		Resolved pending review of the 90% design.		Comment resolved.	90% BOD Section 3.3.3.3, 2nd paragraph, 1st sentence.
188	DOI-80	Section 3.3.3.4, Page 3-41	"Injection wells invariably lose capacity over time."	Please mention the likelihood of adding additional injection wells to increase capacity based on the IM-3 experience.	After the most recent (June 2013) well rehabilitation work, the IM-3 injection wells have been operating near their original capacity. At this time, after almost 7 years of operation, the IM-3 injection wells have not required replacement. The water from IM-3 passes through a micro-filter and is almost completely free from suspended solids. Water to be injected into the FW and IRL wells during the final remedy will not be filtered. In addition, it is likely that bio-fouling will be a factor in the IRL wells where carbon may be added. Since the final remedy injection wells will be receiving water from a different source than the IM-3 injection wells, it is not appropriate to make projections based on IM-3 experience alone.	Okay. DTSC, however, understands that currently there are injection well fouling issues at Hinkley and would like PG&E to consider the lessons learned from similar operations and ensure appropriate responses are in place during O&M at Topock.	Comment resolved.		Comment resolved.	Not applicable
189	DTSC-75	3.3.3.4 Freshwater Injection Wells, Page 3-41	Injection of fresh water extracted from Arizona into	Revise the sentence to also indicate that fresh water injection is required to ensure hydraulic control so that the chromium plume will not migrate	The sentence will be revised to read "Injection of fresh water extracted from Arizona into the wells is planned to be continuous to aid in	Okay.			Comment resolved.	90% BOD Section 3.3.3.3, 1st paragraph, 1st sentence. 90% BOD Apdx B Section 6.4.7

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			the wells is planned to be continuous to aid in reducing the time to cleanup.	beyond identified plume boundaries.	reducing the time to cleanup <u>and provide hydraulic control to prevent migration of the chromium plume beyond identified plume boundaries</u>."					
190	DTSC-76	3.3.3.4 Freshwater Injection Wells, Page 3-41	The anticipated nominal injection flow rate per well ranges from 50 to 100 gpm, and the anticipated maximum flow rate is 100 to 200 gpm per well.	The section should clarify that freshwater is also being proposed to be injected at wells IRL-3 and 4 at a total of nominal flow rate of 300gpm.	PG&E suggests adding a reference to Exhibit 3.3-4 (pages 3-34 and 3-35) at the end of this sentence, rather than spelling out information for IRL-3 and IRL-4 only.	Okay.			Comment resolved.	90% BOD Exhibit 3.3-4 (Footnote a).
191	DTSC-77	3.3.3.4 Freshwater Injection Wells, Page 3-41	If the step testing indicates that the capacity of any injection well is less than three times the design flow rate, consideration will be given to installation of an additional well to ensure that sufficient injection capacity is available for the life of the remedy.	Consideration must also be given to installation of a new well should unexpected contamination be discovered. The potential for this to occur increases where characterization efforts are minimal. For instance, the FW-2 area is not as well characterized as the FW-1 area and might intersect the chromium plume. This issue also applies to other areas and the remedy document must account for these contingent wells. Conversely, wells targeting contamination may come up clean or low yield and need to be drilled in a new location to more efficiently extract contaminants.	Concur. There are numerous factors that will only become known after drilling and testing could affect the need for additional wells or the design of a well. The 90% design will contain a section describing an adaptive approach to well installation which will take into account the various factors that could cause a change in the number of design of wells as they are being installed and provide a process for decision making during the well installation phase.	PG&E should not be waiting to the 90% design to describe such an integral part of the evaluation for remedy design. DTSC will reserve our review of the adaptive approach when it is presented.			Noted.	Construction/ Remedial Action Work Plan, Section 3.1. 90% BOD, Section 3.6.3.
192	DTSC-78	3.3.3.4/3-41	Freshwater Injection wells	Please provide the rationale and basis for the requirement of one third the design flow for injection well replacement. It is recommended that empirical data as well as modeling may help to adequately ascertain the full hydraulic control of each well and the need for replacement.	PG&E suggested that, as a rule of thumb, new injection locations should have a sufficient number of wells to provide about 3 times the design capacity to provide adequate contingency for future decreases in injection flow (see response to comment #164 DOI-69). Because it is not known how much capacity will be lost over time, particularly in the IRL wells that may be subject to bio-fouling or fouling by iron and manganese from the floodplain, modeling would not be useful in establishing a threshold for excess capacity. The trade-off for not providing sufficient excess injection	What if the replacement well also does not exhibit 3 times the proposed capacity, will PG&E move to another well location? When will this stop? Comment resolved.			Comment resolved.	Not applicable.

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					capacity during initial construction is the need for future downtime and intrusion to install new injection wells when existing wells are no longer able to provide sufficient capacity. PG&E believes a factor of three times the design flow is a comfortable margin of safety, however a smaller margin could probably be tolerated so long as there is recognition that it entails more likelihood of remedy down time and well installation in the future.					
193	DOI-81	Section 3.3.3.4, Page 3-42	"Well vaults will be equipped with removable covers . . . "	How many workers are required to remove a cover? Does it make since to use spring-loaded doors on the well vaults?	PG&E plans to have spring-assist lids on well and valve vaults. This feature will be shown in the 90% design.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Appendix E, Specification Section 05 50 00 - Metal Fabrications, Part 2.15, Vault Access Doors and Hatches.
194a	FMIT-28	Section 3.3.3.4	*Freshwater injection wells "During flow rate and capacity testing, injection wells need significantly greater actual capacity than design capacity. If well has low capacity, another well will be drilled to obtain greater capacity."*	What is the limit on this iterative approach? Could the result be too many large boreholes and greater destruction of	Please note that the reference text is incorrectly quoted in this comment. Section 3.3.3.4 states: "Injection wells invariably lose capacity over time. In order to last for the life of the remedial action, it will be necessary for the injection wells to have initial capacity significant greater than their design flow rates. If the step testing indicates that the capacity of any injection well is less than three times the design flow rate, consideration will be given to installation of an additional well to ensure that sufficient injection capacity is available for the life of the remedy." PG&E proposes that as a rule of thumb, initial injection capacity at each FW or IRL location should be approximately three times the design flow rate for that location. Any additional wells needed to achieve this capacity would be installed in the same area as the primary well. Well drilling at any one area would only continue until this target of three times the design capacity was reached. There is also a possibility that the design flow rates for individual well locations could be adjusted to allow for somewhat more injection in the higher permeability locations and somewhat less injection in the lower permeability locations.			Comment resolved pending review of 90% design.	Comment resolved.	Not applicable.

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				the sacred landscape?	PG&E's consideration of installation of additional wells will be conducted consistent with the PA, CHPMP, CIMP, and the cultural resource mitigation measures in the EIR, including but not limited to the requirements that new facilities be placed in areas already disturbed by previous grading and other mechanized activities to the extent practicable (PA, § III(B)(2)(c), EIR Mitigation Measure CUL-1a-9), that existing monitoring wells and related facilities shall be used to the maximum extent practicable (PA, § III(B)(2)(a)) and that PG&E shall, to the extent practicable, restore the areas affected by the Topock Remediation Project. (PA, §§ III(B)(3)(c),V, EIR Mitigation Measure CUL-1a-8(e)).					
194b	Hualapai-21 Chemehuevi-21 Cocopah-21 CRIT-21	Section 3.3.3.4	*Freshwater injection wells "During flow rate and capacity testing, injection wells need significantly greater actual capacity than design capacity. If well has low capacity, another well will be drilled to obtain greater capacity."*	What is the limit on this iterative approach? Could the result be too many large boreholes and greater destruction of the sacred landscape? Please explain the relevance of the cap on the number of wells and how that relates to abandonment of such underperforming wells under this scenario.	See response to comment #194a FMIT-28. The cap on number of wells was established in the EIR, in recognition of tribal sensitivity to activities that involved drilling or digging in the earth. If a well can be replaced in the original borehole, it does not increase the well count. Unless the new well encountered different geologic conditions and/or has significantly smaller capacity than the well it replaced, there would be no net change in the number of wells. If the new well has significantly smaller capacity, it may be necessary to replace an existing well with two wells under. In this case, each of these additional wells at each location would add to the well count. Clarify in the BOD text and indicate in the figure legend that there may be more than one well installed at the FW or IRL well locations initially to ensure sufficient capacity.			Comment resolved pending review of 90% design.	Comment resolved.	Not applicable.

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195	FMIT-29 Hualapai-22 Chemehuevi-22 Cocopah-22 CRIT-22	Section 3.4 p. 3-42 to 3-49	Remedy produced water management	This section does not discuss how well development water will be handled.	Section 3.4.2.1/Exhibit 3.4-3 (page 3-45) and Figure 3.4-1 discuss management options for well development water (wastewater from construction of wells). The identified options included IRZ injection wells, TCS ponds, and trucking offsite. For construction of the initial wells (prior to having the IRZ wells and the remedy produced water condition plant in place), the management options will also include re-injection into the aquifer where the well is drilled and processing at the IM3 treatment plant (after characterization). Text will be added to the 90% BOD.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Exhibit 3.4-3 (last row, Other water – wastewater from construction of wells in the future). O&M Manual Volume 1 Section 6.1.
196	DOI-82	Exhibit 3.4-1, Page 3-42		Regeneration and media bed rinse water from freshwater treatment should be included in the table, and throughout this section.	Comment noted. Since the arsenic treatment system is only intended as a contingency in the 90% design, PG&E proposes to add the requested info (i.e., potential additional volume of remedy-produced water if the contingency were to be implemented) in a footnote rather than in the body of Exhibit 3.4-1. Text will also be updated to reflect the arsenic treatment system only.		Comment resolved.		Comment resolved.	90% BOD Exhibit 3.4-1 (Footnote).
197	DTSC-79	3.4 Remedy-produced Water Management, Page 3-42	These maintenance activities will produce an ongoing water stream that must be managed as part of the remedial action.	For clarity, change “water” in the cited sentence to “waste” (a few other occurrences were noted in the document as well). It is recognized that some waste streams may be reutilized. The usage would be consistent with other sections.	The text will be changed as requested.	Okay.			Comment resolved.	90% BOD Section 3.4.
198	DOI-83	Section 3.4.1, Page 3-43	“Because the characteristics of the rehabilitation wastewater may not be known until it is pumped back out of the well, . . . “	What are the water quality criteria for pumping rehabilitation water to the Water Conditioning Plant?	The following text will be added to this section: “If pumped through the pipelines over long distance, solids could cause obstructions to form in the pipe or accumulate at low points. For this reason, it is better to remove solids closer to the point of generation.”		Comment resolved.		Comment resolved.	90% BOD Section 3.4.1 (3rd paragraph).
199	DOI-84	Section 3.4.2, Page 3-43	“The most efficient way to return the remedy-produced	Delete Carbon-amended Injection Wells for consistency with Exhibit 3.4-2, Item 4 – Reuse by blending with carbon-amended water and injection into the IRZ wells.	Suggested change to text will be made.		Comment resolved.		Comment resolved.	90% BOD Section 3.4.2 (Item #4).

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			water to the aquifer is through the network of NTH IRZ and Carbon-amended Injection Wells associated with the remedial action.”							
200	DOI-85	Section 3.4.2, Page 3-43	“The following four reuse/disposal options are carried forward in the design: . . . “	Instead of trucking water off- site, is it possible to re-use the water for vegetation watering?	There is very little vegetation at the compressor station site that needs watering and there are no other irrigation needs nearby. PG&E does not consider it to be practical to use a periodically-generated water source (such as the water designated for off-site disposal) to meet the site irrigation needs.		Resolved.		Comment resolved.	Not applicable
201	DOI-86	Section 3.4.2, Page 3-43, 4th bullet	“Reuse by blending with other water . . . “	Bullet 4 should read like Exhibit 3.4-2 Item 4 – Reuse by blending with carbon-amended water and injection into the IRZ wells. Blending with (unconditioned?) backwash water or second flush well rehab water seems incorrect.	Suggested changes to the text will be made.		Comment resolved.		Comment resolved.	90% BOD Section 3.4.2.
202	DTSC-80	3.4.1 Transportation, Page 3-43	The wastewater pipelines will be installed in the same utility corridors for other remedy piping to service the wells as shown on Figure 3.0-1.	Indicate and reference sections describing the type of pipelines that will be utilized (e.g., double lined) to transfer the waste streams within the utility corridors.	A reference to Appendix C (Design Criteria), Section C.5.1 (Piping) will be added to the text. Section C.5.1 describes the type of pipelines included in the design (e.g., piping materials, single-walled/ double-walled pipes, leak detection methods).	Okay			Comment resolved.	90% BOD Section 3.4.1 (2nd paragraph).
203	DTSC-81	3.4.2/3-43	Reuse/Disposal Options	The proposed use of wastewater in the cooling tower or reinjection in the in situ reactive zone wells may present challenges in obtaining the quantity and quality diverted. Please provide specific water quality parameters required and viability for the proposed reuse of each said reuse.	See response to comment #181 DTSC-70.	Noted, see response to #181.			Comment resolved.	Not applicable
204	DOI-87	Exhibit 3.4-2, Page 3-44	Discharge to TCS evaporation ponds	Given the potential for higher concentrations of some constituents from the regeneration and bed-rinsing, including arsenic and fluoride, consideration should be given to examining discharge levels yielding	PG&E understands DOI’s comment to ask about the wastewater stream from the freshwater pre-injection treatment system included in the 60% BOD, in compliance with DTSC’s prior directive to include a pre-		Comment resolved pending review of the 90% design.		Comment resolved.	90% BOD Exhibit 3.4-2 (Item #2).

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				potential harmful effects to migratory birds accessing the ponds. Concerns could be reduced through the installation of netting over the ponds, sonic bird repellents or other deterrent. Please discuss the preferred alternative with the agencies prior to choosing a design.	treatment system to polish Arizona groundwater to California standards prior to injection. Since the 60% BOD, the State Board has issued a decision letter and DTSC has provided direction based on that letter that the design criteria for potential future pre-treatment of freshwater at Topock will be limited to arsenic removal only and will be included only as a contingency. The arsenic-only removal process is less complex than arsenic and fluoride removal process, and thus discharge of wastewater containing elevated levels of arsenic and fluoride to the evaporation ponds will not be necessary. Once the remedy is operational, evaluation of concentrations of constituents discharged to the ponds from other remedy wastewater streams and appropriate measures to protect migratory birds, if needed, will be conducted, in cooperation with the agencies. Text will be added to the 90% design to summarize the evaluation of discharge to the ponds.					
205	DTSC-82	Exhibit 3.4-2/3-44	Reuse/Disposal Options and Associated Degree of Conditioning Required	Please use the operation pH range from 6 as mentioned in Section 3.3.3.3 page 3-38 in the process description for consistency. Revise all occurrences of pH range discussion in document.	The text on page 3-38 will be revised to have a pH value of 6.5 in the neutralization step in order to meet the effluent water quality requirements listed on Exhibit 3.3-6 (including pH of 6.5-8.5). No other changes are proposed.	Okay.			Comment resolved.	90% BOD Section 3.3.3.4, Process Description, 2nd sentence.
206	DTSC-83	3.4.2 Reuse/ Disposal Options and Conditioning, Page 3-44	The degree of conditioning needed is a function of how the remedy-produced water will be reused or disposed of, and the discharge requirements that are imposed.	This section should briefly discuss and reference the location of various inject for the remedy.	The following text will be added at the end of the cited text in the 90% BOD: "(see Exhibit 3.4-2, the column titled Conditioning Requirements)". Text on page 3-46, first bullet section 3.4.2.2, will be clarified to make the separation between first flush rehab water and second flush rehab water clearer,	Response sufficient. However, the comment was referring to measureable discharge limits (parameters/acceptance criteria) in general. See comment #181 on water quality limits.			Comment resolved pending review of the 90% Design. See comment #181.	90% BOD Section 3.4.2, 4th paragraph, 1st sentence. 90% BOD Section 3.4.2.2, Conditioning, 2nd paragraph, 1st bullet.

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207	DTSC-84	3.4.2 Reuse/Disposal Options and Conditioning, Page 3-44	Exhibit 3.4-2 2. Discharge to TCS evaporation ponds Produced water must not be hazardous, If the pH is less than or equal to 2.0 (characteristic waste level), the water could not be disposed of in the TCS ponds.	Are there any other limitations related to discharge to the evaporation ponds (e.g., Are existing pond liners and pipelines compatible with all potential waste streams)? Shouldn't the existing design/as-built of this option, and discharge specifications of this and any other existing options, be provided in the document?	Yes, the design criteria (Appendix C) for the groundwater remedy also applies here (e.g., piping compatibility with conveying fluids in Section C.5.1). The regulatory framework for the disposal of remedy-produced water in the TCS evaporation ponds will be included in the 90% design (see also response to comment #623 DTSC-187).	Okay pending review of 90%.			Comment resolved.	90% BOD Exhibit 3.4-2 (Item #2).
208	DTSC-85	3.4.2 Reuse/Disposal Options and Conditioning, Page 3-44.	These options include the Infiltration Gallery in Bat Cave Wash which is retained until the completion of the Soil RFI/RI and CMS/FS and the Moabi Regional Park sewage ponds which is under evaluation.	If not dropped from the design, it would seem that both proposals would need to be fully developed immediately - not after the 90% design.	As stated in response to comment #72a FMIT-21, the infiltration gallery in Bat Cave Wash is not being further evaluated at this time. If PG&E proposes to evaluate this option further in the future, PG&E will discuss the option with agencies and Tribes at that time. This also applies to the Moabi Regional Park sewage ponds option. The referenced text will be revised as follows (inserted verbiage is shown in underline typeface, deleted verbiage is shown in ~~strikethrough~~ typeface): "Two reuse/disposal options for remedy-produced water previously considered are not being further evaluated in the remedy design. ~~retained for further evaluation and are not dropped from consideration as part of the remedy design,~~ These options include the Infiltration Gallery in Bat Cave Wash ~~which is retained until the completion of the Soil RFI/RI and CMS/FS~~ and the Moabi Regional Park sewage ponds ~~which is under evaluation~~. If PG&E proposes to evaluate this option further in the future, PG&E will discuss the option with agencies and Tribes at that time."	Comment resolved. DTSC has not considered these options as part of CEQA assessment. Should PG&E consider them in the future, additional assessment will be required.			Comment resolved.	90% BOD Exhibit 3.4-2 (Footnote).
209	DOI-88	Exhibit 3.4-3, Page 3-45		Discharge from media regeneration/ back wash tanks identified in Section 3.3.3.3 of the freshwater treatment system should be included as a potential source of remedy-produced	Comment noted. Since the arsenic treatment system is only intended as a contingency in the 90% design, PG&E proposes to add the requested info (i.e., potential source of remedy-		Comment resolved.		Comment resolved.	90% BOD Exhibit 3.4-3 (Footnote). O&M Manual Volume 1 Section 6.1.

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				water and produced water management considerations in this section.	produced water if the contingency were to be implemented and associated management options) in a footnote to, rather than in the body of Exhibit 3.4-3.					
210	DOI-89	Exhibit 3.4-3, Page 3-45	Well rehabilitation (all wells) – first flush	Why would this water need to be neutralized and/or filtered to send to the conditioning plant when these are two functions of the conditioning plant? If it is corrosion of the cement mortar-lined pipe, are there alternative pipe materials that can be used so that trucking is used only as a backup?	If pumped through the pipelines over long distance, solids could cause obstructions to form in the pipe or accumulate at low points. For this reason, it is better to remove solids closer to the point of generation.		Comment resolved.		Comment resolved.	Not applicable
211	DTSC-86	3.4.2.1 Management Plan Page 3-45.	Exhibit 3.4-3 3. If first flush water is neutralized in the field and/or filtered with a transportable treatment unit, send water to Remedy-produced Water Conditioning Plant for processing and re-inject into IRZ injection wells.	It is unclear if first flush water <u>will or might be</u> neutralized in the field. Will it always be field neutralized if pH is less than 2 as indicted in Figure 3.4-2. Please clarify in the text and revise Figure 3.4-2 as necessary.	First flush water will be neutralized in the field as shown in Figure 3.4-2. The reference text in Exhibit 3.4-3 will be revised to state: "~~If first flush water is~~ <u>Field neutralization</u> ~~ed in the field~~ and/or <u>field</u> filtered with a transportable treatment unit and then <u>convey</u> ~~send~~ water to the Remedy-produced Water Conditioning Plant for processing and re-inject into IRZ injection wells".	Comment resolved.			Comment resolved.	90% BOD Exhibit 3.4-3 (Item #3). O&M Manual Volume 1 Section 6.1
212	DOI-90	Section 3.4.2.2, Page 3-46, 1st bullet	"If first flush water is neutralized in the field and/or filtered with a transportable treatment unit at the well head, the water may be sent to the Remedy-produced Water Conditioning Plant for processing prior to reinjection into the IRZ injection wells."	Further treatment of first flush rehabilitation water, whether filtered or pH-adjusted, in the Water Conditioning Plant and eventual reuse is not recommended because of the potential presence of high concentrations of dissolved chromate, byproducts and oxidants.	This method is appropriate because some arsenic will be removed through filtration/ neutralization and any remaining dissolved arsenic will be similar in concentration to the reduced environment within the IRZ. Any soluble Cr(VI) that remains will be immobilized by the IRZ.		Comment resolved.		Comment resolved.	Not applicable

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213	DTSC-87	3.4.2.2 Conditioning Page 3-46.	Under the management plan presented above, removal of dissolved constituents will not be required because the injected water quality will be similar to the aquifer water quality in/near the IRZ Injection Wells.	Treated injection water quality must be monitored at some level to ensure appropriate water quality is being injected into the aquifer. This paragraph should briefly discuss monitoring of the treated water and refer the reader to an appropriate monitoring section.	As discussed in Section 1.3 of the BOD (Organization and Content of BOD), this section of the BOD is intended to discuss the design basis and assumptions/ considerations (e.g., number/locations of wells, design flow rates), while Volume 2 of the O&M Manual is intended to address proposed sampling and monitoring during implementation (e.g., sampling frequency/ analytes). For clarity, it is recommended that a sentence be added at the very beginning of Section 3 to refer the reader to Volume 2 of the O&M Manual for sampling/monitoring details, instead of in the subsections.	Comment resolved.			Comment resolved.	90% BOD Section 3, Intro, 3rd paragraph.
214	DTSC-88	Section 3.4.2.2, p.3-46	In the event that the produced water is hazardous, permitted transportable treatment units could be used.	Since PG&E asserts that the proposed cleanup is conducted under the CERCLA permit exemption, this may not apply. However, substantive requirements for such operation would be required, such as record keeping, maximum air quality emission limitations, secondary containment, etc. PG&E should specify these applicable requirements.	Treatment could potentially be performed using a treatment unit operated exclusively at the Topock site, in which case the substantive requirements for a fixed treatment unit (FTU) operating under the Conditional Authorization (CA) permit tier would apply, or a transportable treatment unit (TTU) authorized to operate at multiple sites, in which case the substantive requirements for a transportable treatment unit (TTU) operating under the Permit By Rule (PBR) tier would apply. FTUs operating under CA must comply with all applicable requirements for hazardous waste generators. If treatment occurs in containers, all containers must have secondary containment, be in good condition, managed to prevent leaks, remain closed except when adding or removing waste, and meet hazardous waste labeling requirements. Hazardous waste containers must be inspected weekly. If treatment occurs in tanks the tanks must be equipped with secondary containment and overfill protection and must be labeled as containing hazardous waste. Hazardous waste tanks must be inspected daily and must undergo an integrity assessment by a California-licensed professional engineer (PE). The treatment unit must have written operating instructions and maintain a record of the dates,	Comment resolved pending review of SOPs in the 90% design.			Comment resolved.	Not applicable.

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					concentrations, amounts, and types of waste treated, as well as a written inspection schedule and inspection log. FTUs operating under CA must also maintain a written closure cost estimate and must maintain a financial assurance mechanism if the closure cost estimate exceeds $10,000. Adequate security must be provided. A TTU operating under PBR must meet the following additional requirements in addition to those applicable to the CA tier. Additional records must be maintained, including a written waste analysis plan. Closure must occur pursuant to a written closure plan, and completion of closure must be certified by a California-registered PE.					
215	DTSC-89	Section 3.4.2.2, p.3-46, 1st bullet	The cutover from “early” stage to “later” stage is proposed to be defined through easily measured onsite water quality tests such as pH, turbidity, and conductivity.	This set of identified analysts is too limiting to ensure that it complies with substantive requirements for waste water injection.	This set of parameters is only intended for use in the field to differentiate between the dirtier (first flush) and the cleaner (second flush) water during well rehab events. As described in Section 4.2.2.3.5 of the O&M Manual Volume 1 (page 4-19), during well rehab events, turbid and/or discolored water (first flush) will be removed from the well until the water becomes clear and the well is relatively clean. All first flush water will be contained in temporary, portable tanks, tested, and managed in accordance the updated Figure 3.4-2 of the 60% BOD and Figure 6.1-2 of the O&M Manual Volume 1 (in response to comment #619 DOI-250).	Comment resolved pending review of the 90%.			Comment resolved.	O&M Manual Volume 1 Section 4.2.2.3.5 (page 4-18) and Figure 6.1-2. 90% BOD Figure 3.4-2.
				DTSC is unsure of the regulatory constraints associated with reinjection of waste, even if it is into the same contaminated zone. PG&E should conduct this analysis In the design and specify to reader and agencies for clarity and implementation.	As for reinjection of remedy-produced water back into treatment zone, please see response to comment #181 DTSC-70.	See response to comment #181				

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216	DTSC-90	Section, 3.4.2.2, p.3-46, last paragraph	Furthermore, contaminant migration to the river that could potentially affect water quality goals or beneficial uses does not occur during remedy implementation through groundwater extraction along the river bank.	This would only be true if there is full hydraulic capture of the water flow towards Arizona and the river, and that the remedy as proposed will not send mobilized by products through the IRZ. DTSC requests PG&E to include particle tracking for evaluation as part of the remedy design. Much of the conceptual remedy has changed since the CMS/FS, including elimination of the northern freshwater injection point, and changes in well locations. PG&E should use the particle tracking model to visually demonstrate the resulting flow lines for evaluation of the remedy's ability for hydraulic capture and verify the model through actual sampling during operation.	See response and resolution to comment #646 DTSC-197 regarding particle tracking. Figures for each layer were prepared and submitted to DTSC for review.	DTSC may still consider the evaluation of particle tracking for the future..			Flow field figures for Layers 1-4 were submitted to DTSC and DOI on December 30, 2013 (see **Attachment E**, at the end of this table). Per DTSC request, particle track figures for Layers 1-4 were submitted to DTSC on March 11, 2014 (see **Attachment R** at the end of this table). Particle tracking figures will continue to be included in the 90% Design document. Comment resolved.	90% BOD Section 3.1, Figures 3.1-1 through 3.1-7 90% BOD Appendix B, Figures 6.5-13 through 6.5-20
217	DTSC-91	Exhibit 3.4-4/3-47	Remedy-Produced Water Conditioning Process Schematic	Please provide the disposition of the water obtained as the result of the dewatering process.	The exhibit will be updated to show the water will be returned to the influent tanks for re-processing.	Okay.			Comment resolved.	90% BOD Exhibit 3.4-4. O&M Manual Volume 1 Section 2.3.
218	DTSC-92	3.4.2.2 Conditioning Page 3-48.	Exhibit 3.4-5 Influent solids loading Typical: 60 mg/L total suspended solids Estimated value consistent with Hinkley results.	With the higher TDS encountered at Topock, is it appropriate to always utilize Hinkley results? Should the suspended solids estimate be modified?	It is assumed that this comment addresses TSS, and not TDS. As discussed in Appendix F (pages F-7 to F-10), PG&E conducted a test at Hinkley to evaluate the effectiveness of regular backwashing on an IRZ well. At Topock, the IM-3 injection wells also undergo regular backwash. From a design standpoint, although Hinkley data does not reflect Topock specific conditions, it does show how the IRZ well performs with regular backwashing. Using IRZ backwash data for a design basis is more conservative and appropriate as it contains more suspended solids than IM-3 backwash. In addition, the IRZ backwash water also contains biomass.	Okay.			Comment resolved.	Not applicable
219	DOI-91	Section 3.5.1, Pages 3-49 and 3-50	"Secondary power supply will be power generated from small photovoltaic solar panels . . . "	The text refers to the placement of small photovoltaic solar panels at selected remote sites. Are these sites identified in the 60% Design or will they be identified in the 90% Design? Will solar panels encourage vandalism? Consider appropriate theft-prevention devices (locks, etc.) as necessary to ensure continued function of the secondary power supply.	These small solar panels will be identified in the 90% design. Theft-prevention devices and techniques commonly employed for remote sites will be considered and included as appropriate.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Appendix D, Drawing E-16-01.

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220	DOI-92	Section 3.5.2, Page 3-50		What safety operational alarms will be incorporated into the SCADA that will automatically notify personnel and shut down equipment/systems/operations as required?	At the 60% design stage, precise alarms and control logic have not been fully defined. Examples of safety alarm conditions that would shut down equipment/systems include, but not limited to the following: a) A high level condition in the ethanol storage tank causes an alarm that notifies the operator and tanker to discontinue filling the tank. As a precautionary safety measure, this condition will shutdown the carbon substrate hose pumps and close the downstream flow control valves. b) A high level alarm in the secondary containment pipe downstream of the ethanol tank would shut down the ethanol hose pumps and valves if a leak is detected, indicating a loss of ethanol from the primary pipe. c) A high level in an influent storage tank at the remedy-produced water tank farm causes an alarm that closes the upstream control valve to prevent overfilling. d) A level switch being triggered in any secondary containment (e.g., well or meter vault) would shut down any pumps and close valves associated with that pipeline in an attempt to isolate that portion of piping. An exhibit or table will be added to the O&M Manual, Volume 1 to list the alarm conditions.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1, Table 3.1-1 (Control Set Points and Approaches).
221	DTSC-95	Section 3.5.1, Electrical Power Supply and Distribution, p.3-50		Please note that the December 31, 2011 remedy decision letter from DTSC to PG&E states in condition 2 that PG&E shall obtain a 320 kW generator for the purpose of providing backup electricity at the site for remedy implementation. PG&E should include this condition into the design document.	PG&E will include a generator that meets the condition of approval in DTSC's January 31, 2011 remedy approval letter, in the 90% BOD. The generator will be located on PG&E parcel. The generator will be described in text and shown on maps.	Resolved. DTSC will review the complete electrical system as part of the 90% design.			Comment resolved.	90% BOD Section 3.5.1 and Figure 3.5-1.
222	DTSC-96	Section 3.5.3, p.3-52, rationale 3.	To accommodate the shared use of this bench by the Topock remediation project and Transwestern,	Please reference 3.5-9 in text for this new access road.	A reference to Figure 3.5-9 will be added as requested.	Okay.			Comment resolved.	90% BOD Section 3.5.3.

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			a new access road will be built east of the bench to allow for access to Transwestern's gas transmission equipment.							
223	DTSC-97	3.5.5 Access Roads and Pathways, Page 3-54	Figure 3.5-9	Access routes to every monitoring device (e.g., monitoring wells) will need to be identified. At a minimum, these devices will need to be decommissioned as part of the project.	Comment noted. Figure 3.5-9 presents the access routes to remedy features proposed in the 60% design. This figure will be updated to reflect changes between the 60% and 90% design.	Okay pending review of 90%.			Comment resolved.	90% BOD Section 3.5.5 90% BOD Figures 3.5-9A and 3.5-9B
224	DOI-93	Section 3.6.1, Page 3-55	Borehole Quality Constraints	The in-text citation for DTSC 2011d is not listed in the Reference section.	The in-text citation for DTSC 2011d is listed in the Reference section, please see the 6th reference under California Department of Toxic Substances Control (DTSC).		Comment resolved.		Comment resolved.	Not applicable
225	DTSC-98	3.6 Monitoring Well Design, Page 3-55	However, the details included in this table are estimated and will likely change as additional data are collected during construction.	Due to acknowledged uncertainties when installing new wells, contingencies should be made for additional monitoring wells. It is just too difficult to forecast future needs without the data in hand. Additional DTSC comments regarding the number of monitoring wells are identified in Appendix L.	PG&E recognizes the uncertainty associated with installing new wells. Information will be gathered throughout the remedy lifetime as new wells are installed and the remedy is optimized. This information will be used further refine understanding of the hydrogeology and contaminant distribution. PG&E acknowledges that additional monitoring wells may be necessary based on new information as it becomes available. Buffer has been built into the monitoring network design to allow for this contingency, while respecting cultural sensitivities and the EIR 60 borehole limit.	Comment resolved pending review of the 90% design. See also response to comment #632 DTSC-190.			Comment resolved.	Not applicable
226	DTSC-99	3.6 Monitoring Well Design, Paragraph 2, Page 3-55		In addition to a table, this section should include a figure illustrating where the monitoring wells are located in map view. Suggest easy read format similar to Figure 3.1-1.	A figure will be added as requested in the 90% BOD.	Comment resolved pending review of the 90%.			Comment resolved.	90% BOD Section 3.6.
227	DTSC-100	3.6.1 Key Variables and Well Design Considerations, Page 3-55	Depth-specific samples and continuous core collected during drilling have been useful at the Topock site when designing monitoring	The underlined last sentence will need to be modified as utilizing depth specific data as well as continuous core can also be mandatory for establishing remedial wells. Please revise to capture both aspects of this issue.	The two referenced sentences will be deleted from the text. The 90% design report will present a comprehensive strategy for data gathering during well design and installation. This approach will make use of all available data at the time each well is drilled to determine what additional data needs to be collected during drilling.	Comment resolved pending review of the 90% design.			Comment resolved.	90% BOD Section 3.6.1. Construction/Remedial Action Work Plan Section 3.2.

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			wells intended to characterize the plume. <u>However, the effort to obtain this data to determine screened intervals of remediation monitoring wells, which may be located in a plume undergoing active remediation, may not be warranted at all locations.</u>							
228	DTSC-101	3.6.1 Key Variables and Well Design Considerations, Page 3-55	However, the number of available boreholes is limited (DTSC 2011d). <u>No more than 60 boreholes can be installed for the construction of monitoring wells.</u>	DTSC based the number of wells on estimates provided by PG&E at a stage when the remedy was quite conceptual. While every effort should be made to minimize the total number of wells, if necessary, wells should be installed for an identified purpose and not be artificially bound by the specific well counts for the design. Please evaluate this section based on need and possible contingencies and not well count.	The EIR was developed to balance potential impacts of the remedy implementation, including impacts to cultural resources. As such, limitations were placed on the number of boreholes for remedial wells and monitoring wells. PG&E maintains that it is important to stay within these limitations that were specified in the EIR to preserve an appropriate balance between remedy implementation and minimizing impacts. With regards to the design of the monitoring program, the locations and number of monitoring wells were decided upon to provide the necessary density of data to meet the data quality objectives detailed in the Sampling and Monitoring Plan (Appendix L, Volume 2). The referenced text in Section 3.6.1 is specific to how monitoring well design influences the number of boreholes that will be needed. Section 3.6.2 provided an evaluation of several monitoring well design options and factors to consider in selecting a design, including the number of boreholes that will be required, well utility, and constructability and longevity. Use of monitoring wells that place multiple well screens within a single borehole will allow greater data density and vertical coverage while minimizing	Comment resolved pending review of the 90% design. See response to comment #632 DTSC-190.			Comment resolved.	Not applicable

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					the number of boreholes. In summary, the monitoring well cap specified in the EIR is achievable while providing the appropriate data density to meet data quality objectives. One potential exception that may lead to exceedance of the EIR cap is any potential State Water Board requirement to include monitoring wells in specific directions and at specific distances around the freshwater injection wells. See also response to comment #225 DTSC-98 and #632 DTSC-190.					
229	DTSC-102	3.6.1 Key Variables and Well Design Considerations, Page 3-55		The section should add anticipated decommissioning technique as a variable, as some of the more exotic designs may require overdrilling as the preferred decommissioning method. For this site, the decommissioning approach should be considered up front.	An additional design detail bullet (Well Decommissioning) will be added to the discussion of each well design detailed in Section 3.6.2.	Okay pending review of the proposed additions.			Comment resolved.	90% BOD Section 3.6.2. Construction/Remedial Action Work Plan Section 3.2. O&M Manual Volume 1 Appendix B, Well Decommissioning SOP.
230	DOI-94	Section 3.6.2, Page 3-56		Please provide graphic design details on how wells will be constructed, and QA/QC procedures to be employed.	Conceptual drawings for each of the well designs detailed in Section 3.6.2 will be included in the 90% BOD.		Resolved pending review of the 90% design.		Comment resolved.	90% BOD Appendix D, Drawings C-16-01 through 03.
231	FMIT-31 Hualapai-23 Chemehuevi-23 Cocopah-23 CRIT-23	Section 3.6.2 p. 3-56 to 3-58	Well design options	Where the water table is within about 18 feet of land surface, a peristaltic or centrifugal pump might be used to collect water samples. With borehole size limitations, numerous zones could be sampled using tubes for sampling access, rather than submersible pumps in nested wells.	PG&E agrees that the use of small diameter pumping systems are beneficial when there are limitations on borehole diameter, multiple zones within one borehole must be monitored, and the depth to water is shallow. However, as detailed in Section 3.6.1 there are several other design variables that must be considered for the Topock site when determining the appropriate diameter of a monitoring well casing.			Comment resolved pending review of 90% design documents.	Comment resolved.	Not applicable
232	DTSC-103	3.6.2 Well Design Options, Page 3-57	Dual-screen Wells. This design has been used in two bedrock boreholes in the East Ravine area, and is also planned for many of the IRZ wells associated with the final groundwater remedy.	The section must discuss the failings of the packers in both of the two East Ravine wells and how PG&E plans to overcome those failure modes in the final design.	A specific reference to the failings of inflatable packers when used in East Ravine wells will be added to the "Constructability and Longevity" bullet for dual-screen wells. The failure mode observed in these wells is inherent in the design of inflatable packers. As detailed in this section, inflatable packers can be maintenance intensive and may require periodic replacement, which is not desirable for monitoring wells because the isolation of the two monitoring intervals is lost. This is a different operating condition than that of the remediation wells. Packers used in remediation wells	Response noted. However, DTSC may request that packers be utilized in monitoring wells, to be evaluated on a case by case basis.			Comment resolved.	90% BOD Section 3.6.2.

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					serve to isolate screened intervals and facilitate the distribution of varying quantities of carbon amended water to each screened interval individually, but long-term isolation is not a requirement. Therefore, packers are ideal for use in remediation wells because there are opportunities to remove and maintain them, as necessary. See responses to comment #132 DTSC-40 for clarification on the use of packers in monitoring wells during the East Ravine investigation and #90 DTSC-25 regarding the types of packers included in the remediation well design.					
233	DTSC-104	3.6.2 Well Design Options, Page 3-57 and 58		Please add a section discussing the ability of the different well designs to accommodate pressure transducers. The flat gradients and continuously changing river stage make this a very important consideration for well design.	The need for monitoring wells to be able to accommodate water level transducers is identified in Section 3.6.1 as a design consideration (well utility). The text in Section 3.6.2 already speaks to the ability of each design to be scaled to accommodate required sample equipment. However, as requested, pressure transducers will be specifically identified in these sections (note that pressure transducers are already specifically mentioned for multi-level wells).	Okay.			Comment resolved.	90% BOD Section 3.6.2.
234	DTSC-105	3.6.2 Well Design Options, Page 3-58	Multi-level Wells. Multi-level well designs vary significantly by manufacturer, but many of them include elastomeric materials in the sealed intervals which may not be stable in the subsurface environment at the Topock site.	Please elaborate on the elastomeric materials used in some multilevel wells as it is not certain how this can affect Topock data collection efforts.	This statement was meant to highlight the fact, that based on site experience with the FLUTe liners, there may be a problem with some materials in the reduced environment of the bedrock or IRZ. PG&E does not have information on the specific properties of all the elastomeric materials used in the different multilevel samplers and many of these are likely proprietary. The statement will be expanded to read: "Multi-level well designs vary significantly by manufacturer, but some of them include elastomeric materials in the sealed intervals which may not be stable in the subsurface environment at the Topock site. <u>Based on experience with FLUTe liners in the East Ravine, it is recommended that testing be conducted prior to deployment of any multilevel system that contains</u>	Okay.			Comment resolved.	90% BOD Section 3.6.2.

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					elastomeric materials to insure the stability of those materials in a geochemically reduced environment.”					
235	DTSC-106	Table 3.6-2	Well ID	Although PG&E specified the type of monitoring by well IDs, it would be good to reference the accompanying map or figure that has the Well ID labeled (i.e. footnote to see Figure 3.0-1). Furthermore, PG&E should color code the types of monitoring on a figure. This will provide easier visual reference of information contained in this table.	Reference to monitoring well location figure(s) and color coding will be added as requested in the 90% BOD.	Okay pending review of the 90%.			Comment resolved.	90% BOD Figure 3.6-1.
236	DTSC-107	Table 3.6-2	Type of Monitoring	The selected wells for extraction well monitoring, Freshwater injection well monitoring and plume monitoring seem limited. Also, little rationale is provided on why only the selected wells identified are chosen. Would prefer to identify type of monitoring based on particle tracking.	A footnote will be added to Table 3.6-2 in the 90% BOD, to state the basis for identification of type of monitoring. Please refer to response and resolution to comment #646 DTSC-197 regarding particle tracking.	Comment resolved pending review of the 90%. Also see response to comment #216 DTSC-90.			Comment resolved.	90% BOD Table 3.6-2.
237	DTSC-108	3.3.3.1 Freshwater Supply Piping Network, Page 3-35.	Figure 3.0-1	Include the pipeline and connection from the Topock 2-3 wells that will be used for this remedy of figure 3.0-1. Also include or reference an existing drawing that only shows the freshwater piping.	As discussed in RTC #168 DTSC-63, PG&E will separate the freshwater supply and storage for the remedy and the Compressor Station. Topock-2/3 wells will continue to supply water for Compressor Station use via the existing 6-inch pipeline. Because of this separation of freshwater storage, the connection for Topock-2 and 3 wells will be eliminated in the 90% design. Figure 3.0-1 will be updated to reflect this separation and show the new freshwater storage tank for the remedy. Reference will be made to a new figure that only shows the freshwater piping.	Comment resolved pending review of the 90%.			Comment resolved.	90% BOD Exhibits 3.3-1, 3.3-4.
238	DTSC-109	Figure 3.4-1	A Side Remedy	According to text, PG&E will consider final disposition of remedy generated water to TCS cooling tower, evaporation pond and off-site disposal. These options are not depicted in figure from A Side.	Note “**” on Figure 3.4-1 enumerates the referenced options.	Okay, but prefer options to be considered be depicted beyond a footnote.			Comment resolved.	Not applicable
239	DTSC-110	Figure 3.5-2	Conceptual Visualization	Will the new proposed new access road for Transwestern be paved or native dirt road as depicted? PG&E should label the new road as well.	The new single-lane access road to the north side of the Transwestern bench will have a compacted commercial road base surface. This road will be labeled “Transwestern North Access Road”.	Okay.			Comment resolved.	90% BOD Figure 3.5-2.
240	FMIT-30	Figure 3.5-6		Can anything be done to remove the existing and proposed tanks from the	The existing tanks cannot be removed as they are essential to the operation of the Compressor Station.			The Tribe requests evaluation of relocating the proposed new tank. The Tribe prefers	PG&E will evaluate the Tribe’s request as part of the 90%	The proposed conditioned water tank was relocated to a lower

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				mountain side?	The proposed conditioned water tank is located on an existing bench on the hill to take advantage of the gravity flow to minimize energy usage. No changes are proposed for these tanks.			that the foothills remain without infrastructure. Hualapai concurs with the FMIT.	design.	elevation. See 90% BOD Figures ES-5 and ES-6.
Specific Comments – Section 4										
241	DOI-95		General Comment Regarding Building Construction	Please see the attached memorandum entitled *Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding* (Attachment C), and integrate construction principles as appropriate.	PG&E will review the attached memorandum and integrate construction principles into the groundwater remediation project as appropriate.		Resolved pending review of the 90% design.		Comment resolved.	90% BOD Table 4.0-1.
242	DOI-96	Page 4-1		During the implementation phase of the groundwater treatment program, will PG&E look into the following green remediation factors? • Operation of energy-efficient equipment at peak performance • Periodic evaluation and optimization of equipment with high energy demand • Management of demand to leverage low peak capacity and rates • Minimization of particulates/dust during construction	Yes. Performance of the system and individual pumps will be monitored with process measurement devices such as flowmeters, pressure transmitters, and electrical metering. The plant control system will be utilized to minimize the peak electrical demand. Data will be tracked over time and alarmed if it falls outside of an acceptable range. At that time, the equipment or process can be further analyzed for issues that have caused it to loose efficiency or require more power. The following text will be added as an additional bullet in Table 4.0-1 in Energy Use: "O&M activities will minimize energy use by optimizing equipment via routine maintenance and minimizing energy consumption during peak energy use periods." As for minimization of particles/dust during construction, primary dust control measures such as surface wetting and/or stabilization will be implemented. Vacuum methods are also available as a secondary measure for dust control, if needed.		Comment resolved.		Comment resolved.	90% BOD Table 4.0-1.
243	FMIT-32	Section 4		This section describes PG&E's Sustainability Practices. This policy was adopted in 2011 and updated in 2012. PG&E has been applying it to Topock. The Tribe believes that this policy should have been developed in consultation with the Tribe pursuant to the 2006 FMIT-PG&E settlement agreement. This policy should be informed by consultation with the Tribe. When will PG&E engage the	<u>Proposed revision to the RTC is below in bold/underlined:</u> PG&E initially developed its Programmatic Sustainable Remediation Guidance in 2011 in close collaboration with DTSC. PG&E has applied the Guidance to over 75 remediation projects, and specifically to the Topock Remediation Project since last year. The Guidance provides for the application of				PG&E's response was discussed with the FMIT, and revised in response to that discussion.	Not applicable.

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				Tribe in this effort?	sustainability at any point during the remediation project life cycle, from project planning through site closure and post-remediation site conditions, where applicable, and provides a standardized process for the integration of sustainable practices across PG&E remediation projects. ~~PG&E does not believe that the 2006 Settlement Agreement is implicated by the Programmatic Sustainable Remediation Guidance. PG&E is always open to comments on its practices, including from the FMIT.~~ PG&E does not believe that the 2006 Settlement Agreement is implicated by the Programmatic Sustainable Remediation Guidance. PG&E understands that the FMIT disagree with this conclusion and that the Tribe believes that it should have been consulted by PG&E on the development of the Programmatic Sustainable Remediation Guidance. While PG&E and the FMIT continue to have different views on the requirements of the Settlement Agreement with respect to the Programmatic Sustainable Remediation Guidance, PG&E is open to any comments on the Programmatic Sustainable Remediation Guidance from the FMIT. If the FMIT offers such comments on the Programmatic Sustainable Remediation Guidance itself, PG&E and the FMIT will follow up on this issue outside the remedy response-to-comment process. If the FMIT has any specific comments on the application of the Programmatic Sustainable Remediation Guidance to the groundwater remedy at 90% Design, PG&E will respond to such comments during the 90% Design RTC process.					

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Specific Comments – Section 5										
244	DOI-97	Page 5-1	"The SOB (DTSC 2011) stated that due to the incomplete evaluation of soil contamination . . . "	The in-text citation for DTSC 2011 is not listed in the Reference list section.	The letter "a" will be added after 2011.		Comment resolved.		Comment resolved.	90% BOD Section 5, 3rd paragraph.
245	DOI-98	Page 5-1, 1st bullet	Category 1 ICs	Based on current hydrogeologic understandings, should groundwater withdrawal usage by the private sector in the vicinity of the freshwater supply well(s) require an IC to protect quantity supply issues to the treatment program?	As indicated in Figure 5.1-1 (page 211 of the PDF), PG&E is still evaluating the need for and/or scope of an institutional control at and around HNWR-1 well, for the purpose of ensuring the quantity of freshwater needed for the remedy over its decades long operation. PG&E notes that policies for the management of surface uses and the use of groundwater on the HNWR are included in the 1994 Lower Colorado River National Wildlife Refuges Comprehensive Management Plan.		Comment resolved.		Comment resolved.	90% BOD Figure 5.1-1.
246	DOI-99	Section 5.1, Page 5-2		This subsection defines areas for future restrictions. If groundwater quality may be an issue in the future, does PG&E plan on performing a Wellhead Protection Study to ascertain where spills, leaks, chemical storage areas, etc., may impact the water quality upgradient of the freshwater supply well during operation in order to apply/seek any development restrictions?	The section titled "Source Water Assessment" on page 3-30 describes the approach taken to identify the wellhead protection zone around HNWR-1 based on Arizona guidance. Exhibit 3.3-3 shows the estimated radius of the wellhead protection zone There are no major sources of groundwater contaminants in this zone. PG&E does not propose to seek development restrictions for the purposes of wellhead protection. However, as indicated in Figure 5.1-1 (page 211 of the PDF), PG&E is still evaluating the need for and/or scope of an institutional control at and around HNWR-1 well, for the purpose of ensuring the quantity of freshwater needed for the remedy over its decades long operation. PG&E notes that policies for the management of surface uses and the use of groundwater on the HNWR are included in the 1994 Lower Colorado River National Wildlife Refuges Comprehensive Management Plan.		Comment resolved.		Comment resolved.	90% BOD Figure 5.1-1.

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247	DTSC-111	5.1 Define Areas for Future Restrictions, Page 5-2.	Information obtained from the Topock Marina on Historic Route 66 during the first quarter 2013 indicates that they are planning to conduct exploratory drilling on their property in hope of locating a groundwater supply well that can produce about 2000 gallons per minute for use as fire protection water at their future facility. Target timing is 2013.	Update this item as the Topock Marina well has already been installed. Include any future plans the marina owners may be considering for water sources for existing and planned future development.	The Topock Marina has completed a 4-inch test well, but has not yet completed a production well. The text in this section will be updated to reflect what is known about Topock Marina water supply at the time the 90% design is submitted.	Okay pending review of the 90% BOD.			Comment resolved.	90% BOD Section 5.1, 2nd paragraph, 2nd bullet.
248	FMIT-33	Section 5.3.2		This summary does not appear to fully track the 2006 settlement between FMIT-PG&E. This section should be revised in consultation with the Tribe for accuracy regarding the nature of the easement and provisions for the Tribe's consent.	This comment was discussed at Sept TWG meeting, and PG&E and FMIT counsel further discussed it following up on that meeting. PG&E invites the FMIT to provide further clarification as to the specific text in section 5.3.2 that is of concern.				Comment resolved, pending any further clarification from the FMIT.	Not applicable.
249	DTSC-112	5.3.2 Access to Non-Federal Lands, Page 5-4	Access agreements with private property owners for remedial structures on their lands, where such agreements do not otherwise exist It should be noted that under the Settlement Agreement between PG&E…	The first sentence is incomplete and requires revision.	The subject sentence is complete and was intended as the 7th (last) bullet in Section 5.3.2. The text will be revised to add a bullet before the sentence.	Okay.			Comment resolved.	90% BOD Section 5.3.2.

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250	DOI-100	Table 5.1-1A (Page 5-5) and Figure 5.1-1		The text in the table indicates that the Caltrans ROW, parcel number is 650-161-09 is under HNWR/USFWS management and BLM ownership. The property is BOR withdrawn land, not BLM, managed by USFWS. Consider including soil storage/staging areas in the Potential Remedial and Investigative Activities column, (parcel 650-161-02 et al.).	Text and figure will be revised as requested.		Comment resolved.		Comment resolved.	90% BOD Table 5.1-1A.
Specific Comments – Section 6										
251	DOI-101	Section 6.2, Page 6-1	"There are 57 RARs that address several resource areas . . . "	The in-text citation for BLM 2012 is not listed in the Reference section.	The in-text citation for BLM 2012 is listed in the Reference section; please see the 5th reference under U.S. Bureau of Land Management (BLM).		Comment resolved.		Comment resolved.	Not applicable
252a	FMIT-34	Table 6.1-1		There are several references to the Corrective Measure Construction/ Remedial Action Work Plan, the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (part of CIMP), and, the Closure Plan for Decommissioning of Remedy Facilities and Restoration. However, none of these plans yet exist, and thus compliance with a number of the relevant EIR Mitigation Measures is impossible to assess at this time and therefore should not be concluded as such in the BOD.	The column that lists these documents is titled "Which document(s) will contain or satisfy this measure?" The intent of this column is to identify what current or future document(s) are intended to satisfy this measure and be transparent on future forthcoming documentation. This column is not intended to document compliance with the mitigation measure. A footnote will be added to this effect.			Comment resolved.	Comment resolved.	90% BOD Tables 6.1-1 and 6.2-1.
252b	Hualapai-24 Chemehuevi-24 Cocopah-24 CRIT-24	Table 6.1-1		There are several references to the Corrective Measure Construction/ Remedial Action Work Plan, the Plan for Decommissioning and Removal of IM-3 Facility and Site Restoration (part of CIMP) and the Closure Plan for Decommissioning of Remedy Facilities and Restoration. However, none of these plans yet exist, and thus compliance with a number of the relevant EIR Mitigation Measures is impossible to assess at this time.	See response to comment #252a FMIT-34.			Comment resolved.	Comment resolved.	90% BOD Tables 6.1-1 and 6.2-1.
253	DOI-102	Table 6.1-1, Mitigation Number AIR-1c, Page 6-6	"c) Stabilize (using soil binders or establish vegetative cover) . . . "	In the event PG&E selects vegetative cover for stabilization, there is an expectation that indigenous species will be used. Please provide references regarding revegetation protocols. How long will the plant cover be maintained and watered to assure establishment/germination? Also, please propose criteria that will be used to determine successful	AIR-1c addresses control of air pollutants and precursors during construction and requires soil stabilization in the form of soil binders or vegetative cover. As presented in Table 6.1-1, if soil stabilization will be accomplished through vegetative cover, native fast-growing plants will be used. Plant cover will be maintained only to establish soil stabilization with the		Comment resolved pending review of 90% design.		Comment resolved.	Section 2.1 of the Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats (Appendix to the Construction/Remedial Action Work Plan) states that the use of herbaceous vegetation covers as a soil stabilization technique is not being proposed for this project because this approach was not considered appropriate

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				vegetation/stabilization.	assumption that the surrounding native vegetation will eventually naturally re-establish at the site. The RAWP will include a list of potential plants to be used as vegetative covers, stabilization agents and methodologies to be used.					for this environment. Soil stabilization techniques will be an integral part of stormwater pollution prevention because these measures minimize dust and protect desert topsoil, particularly in areas of contamination or with minimal surface soil.
254	DOI-103	Table 6.1-1, Mitigation Number BIO-1, Page 6-7	"During the preliminary (30%) design, it has been determined that complete avoidance of habitats under USACE jurisdiction (e.g., Bat Cave Wash) is not feasible . . . "	Will the 90% Design identify the area where wetland rehabilitation will occur in order to achieve "no net loss"?	At the 60% design stage, no net loss of wetlands are anticipated with implementation of the remedy (see Section 2.4 and Figure 2.4-5 of the BOD). This expectation will be verified at 90% design. Note that Bat Cave Wash is a Jurisdictional Waters of the U.S. but is not a wetland. Bat Cave Wash is characterized by very short, infrequent flows in response to rain events. Any flows or accumulation of water infiltrate quickly following rain events. Minor impacts to this drainage would not result in the loss of hydrologic function and mitigation measures including replacement of any impacted trees would ensure no loss of habitat value.		Comment resolved.		Comment resolved.	90% BOD Table 6.1-1 (mitigation measure BIO-1) and Figure 2.4-5.
255	DOI-104	Table 6.1-1, Mitigation Number BIO-1, Page 6-8		References to the CDFW 2013 source do not include the year.	The year 2013 will be added to the CDFW reference in the Reference section.		Comment resolved.		Comment resolved.	90% BOD Section 9.
256	DOI-105	Table 6.1-1, Mitigation Number CUL-1a-8a, Page 6-16		The in-text citation for Q4 2011 is not listed in the Reference section.	In this instance, the wording "(Q4 2011)" is not intended as in-text citation, but rather to note for the reader that the first published quarterly report is the Fourth Quarter 2011 report.		Comment resolved.		Comment resolved.	Not applicable
257	FMIT-35	Table 6.1-1	BIO-1	There has been no outreach from the tribe on this 404 permit as it was assumed that waterways or pumping directly from the river would not occur. However, now that this is occurring, the Tribe requests a meeting with PG&E for the purpose of explaining exactly the context of a request for exemption. Additionally, the Tribe believes the USACE consult with the Tribe.	The 60% design does not include a river intake structure or pumping directly from the river. The context of a request for exemption and the role of USACE was discussed with Tribes at the August 21, 2013 meeting in FMIT's office in Needles (the MMRP meeting between DTSC and Tribes).			Review in progress. The Tribe seeks a direct consultative relationship with all agencies involved with the project.		Not applicable
258	DOI-106	Table 6.1-1, Mitigation Number GEO-1a-a,	"A grading and erosion control plan will be prepared . . . "	Will the plan address segregating and stockpiling top soil so it can be reused in an effective manner?	The grading and erosion control plan will be prepared to meet the substantive requirements per San Bernardino County. The plan will		Resolved pending review of the 90% design.		Comment resolved.	90% BOD Appendix E Specification Sections 31 10 00 (removal and segregation) and 31 23 23 (Fill and Backfill).

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		Page 6-27			address management of top soil consistent with the response to comment #774 FMIT-193.					
259	DOI-107	Table 6.1-1, Mitigation Number HAZ-2c, Page 6-32	"c. Should evidence of contaminated soil be identified during ground disturbing activities (e.g., noxious odors, discolored soil), work in this area will immediately cease until soil samples can be collected and analyzed . . . "	What mitigative measures, such as stabilization and wetting, will be implemented to minimize dust generation, and thereby prevent/minimize the spread of any contamination, until test results are known? Where will specific soil removal protocols be identified (i.e., monitoring, removal methods, additional sampling requirements, runon/runoff and dust control measures, etc.)?	Primary dust control measures will be surface wetting and stabilization. Vacuum methods are also available as secondary measures, if needed. Potentially contaminated soils encountered in situ will be covered/ isolated to minimize the potential for migration until laboratory results are received. Details on soil removal protocols will be included in the Remedial Action Work Plan.		Comment resolved.		Comment resolved.	Construction/Remedial Action Work Plan Sections 3.1 and 4.
260	FMIT-36 Hualapai-25 Chemehuevi-25 Cocopah-25 CRIT-25	Table 6.1-1 p. 6-17	Noise-1a	Vibration-sensitive land uses are assumed to consist only of residential and mobile home parks. Based on this assumption Tribal land uses are neglected. Tribal land use must be considered.	The stated assumption is consistent with the certified EIR (see page 4.9-20), and was expressly mentioned in both the 30% and 60% designs. No comments were received on this topic in the 30% design.	Noise and vibration- sensitive receptors are discussed in the Noise and Vibration-Sensitive Land Uses in section 4.9.1.5 which did identify the Topock Cultural Area as a sensitive land use.		The DTSC response indicates that noise and vibration sensitive land uses in section 4.9.1.5 did identify the Topock Cultural Area as a sensitive land use. We note that, apparently, no impacts to this use were analyzed. The development of the 90% Basis of Design Report should include a consultation with the Tribes to consider and identify vibration and noise sensitive Tribal uses and users. Comment closed. The Tribes would request that as sound monitoring details are resolved, the usage of the Topock area as a location of deep spiritual meaning and associated usage would be taken into account to the fullest extent possible.	This comment and the responses were discussed at the December 12, 2013 TWG telecon. The TRC (Charlie Schlinger) presented draft proposed language for Tribes' response at the February 11, 2014 TWG meeting. The Hualapai Tribe provided a letter with language to close out the unresolved noise and vibration-related comments (see **Attachment H**, at the end of this table).	90% BOD Table 6.1-1.
261	FMIT-37 Hualapai-26 Chemehuevi-26 Cocopah-26 CRIT-26	Table 6.1-1 p. 6-17	Noise 1-b	It is not sufficient to manage communication with vibration-sensitive receptors concerning vibration issues and complaints. There needs to be a meaningful and functional set of protocols for both communicating and resolving issues and complaints. Further, applicable vibration standards need to be spelled out and the basis for their	The certified EIR specifies the requirements for mitigation measure Noise-1b. PG&E defers to DTSC on response to comment regarding the sufficiency of the requirements and applicable standards.	Potential noise and vibration impacts were fully evaluated and circulated for comments in the June 2010 Draft EIR prior to finalization and certification in January 2011. The applicable standards, threshold of significance and impact analysis can be found in Sections 4.9, and 6.4.9 of the FEIR. The identification of a		Comment stands. Tribal concerns regarding noise may be different than applied regulatory standards. The Tribes would like to continue a dialogue with the agencies to further clarify the nature of noise and vibration impacts.	This comment and the responses were discussed at the December 17-18, 2013 TWG meeting.	Not applicable

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				selection provided.		disturbance coordinator by PG&E is to ensure an open channel of communication between the project proponent and anyone who might have concerns over the proposed activities. Furthermore, mitigation measure CUL-1a-8h provides for a protocol to be developed in partnership with the Tribes to address issues associated TWG teklewith noise and vibration.				
262a	FMIT-38	Table 6.1-1 p. 6-17	Noise-2a	While the Mitigation Measure calls for utilization of the “best-available noise suppression devices”, the 60% Action calls for “available noise suppression devices”; if no devices are available, then conceivably, no devices would be utilized. No explanation is provided for the deviation from the adopted mitigation measure. Proposed deviations from any mitigation measure should be done in an open manner with an opportunity for the Tribe to comment.	There is no proposed deviation to the EIR mitigation measure. The word “best” will be inserted before “available” in the future 90% Action column.			Comment resolved.	Comment resolved.	90% BOD Table 6.1-1 (Noise-2a).
262b	Hualapai-27 Chemehuevi-27 Cocopah-27 CRIT-27	Table 6.1-1 p. 6-17	Noise-2a	While the Mitigation Measure calls for utilization of the “best-available noise suppression devices”, the 60% Action calls for “available noise suppression devices”; if no devices are available, then conceivably, no devices would be utilized. No explanation is provided for the deviation from the adopted mitigation measure.	See response to comment #262a FMIT-38.			Comment resolved.	Comment resolved.	90% BOD Table 6.1-1 (Noise-2a).
263	FMIT-39 Hualapai-28 Chemehuevi-28 Cocopah-28 CRIT-28	Table 6.1-1 p. 6-18	Noise-2c	While vibration-sensitive receptors are discussed and identified as part of Noise-1, there is no similar discussion and identification of noise- sensitive receptors.	The certified EIR defined noise sensitive receptors in Chapter 4.9.1.5 (Existing Noise Environment, page 4.9-5).	Noise and vibration- sensitive receptors are discussed in the Noise and Vibration-Sensitive Land Uses section 4.9.1.5 which did identify the Topock Cultural Area as a sensitive land use.		The DTSC response indicates that noise and vibration sensitive land uses in section 4.9.1.5 did identify the Topock Cultural Area as a sensitive land use. We note that, apparently, no impacts to this use were analyzed. The development of the 90% Basis of Design Report should include a consultation with the Tribes to consider and identify vibration and noise sensitive Tribal uses and users. Comment closed. The Tribes would request that as sound	This comment and the responses were discussed at the December 12, 2013 TWG telecon. The TRC (Charlie Schlinger) presented draft proposed language for Tribes’ response at the February 11, 2014 TWG meeting. The Hualapai Tribe provided a letter with language to close out the unresolved noise and vibration-related comments (see **Attachment H**, at the end of this table).	90% BOD Table 6.1-1 (Noise-2c).

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								monitoring details are resolved, the usage of the Topock area as a location of deep spiritual meaning and associated usage would be taken into account to the fullest extent possible.		
264	FMIT-40 Hualapai-29 Chemehuevi-29 Cocopah-29 CRIT-29	Table 6.1-1 p. 6-18	Noise-2d	It is not sufficient to manage communication with noise-sensitive receptors and concerning noise issues and complaints. There needs to be a meaningful and functional set of protocols for both communicating and resolving issues and complaints. Further, applicable noise standards need to be spelled out and the basis for their selection provided.	In conformance with requirements in the EIR MMRP, mitigation measure CUL-1a-8h (Protocols for the appropriate methods, consistent with mitigation measure Noise-3, to reduce auditory impacts) was developed as part of the draft CIMP with inputs from Tribes. The draft CIMP was submitted to the Tribes for review on July 8, 2013, and comments were received from Tribes on October 22, 2013. PG&E will review and discuss these comments with Tribes prior to submitting the draft CIMP to DTSC at 90% design. PG&E defers to DTSC on response to comment regarding the sufficiency of the requirements and applicable standards. The certified EIR lists the applicable noise standards for the remedy. Section C.11 of Appendix C contains the noise design criteria for the remedy.	See response to comment #261 FMIT-37.		Comment stands. Tribal concerns regarding noise may be different than applied regulatory standards. The tribes would like to continue a dialogue with the agencies to further clarify the nature of noise and vibration impacts. The FMIT requests to review the CIMP prior to the 90% design submittal.	This comment and the responses were discussed at the December 17-18, 2013 TWG meeting.	CIMP Noise Protocol CUL-1a-8h (the CIMP Is included as an appendix to the Construction/ Remedial Action Work Plan).
265a	FMIT-41	Table 6.1-1 p. 6-21	CUL-1a-10	Regarding certain (e.g., noise, aesthetics, etc.) impacts on the Topock Maze and the associated sacred area, the 60% BOD report states, as did the 30% BOD report, that "prevention of indirect impacts to the Maze will be incorporated into the design to the maximum extent feasible as determined by DTSC". Where is the process spelled out for such a determination by DTSC? Additionally, the Tribe does not consider such impact "indirect." They are direct impacts.	PG&E defers to DTSC as the language cited in the comment is copied verbatim from the certified EIR.	DTSC makes such a determination through oversight of PG&E's implementation of mitigation measure to avoid any identified archaeological sites. PG&E will also conduct pre-construction survey and if necessary follow CHPMP requirements for treatment if avoidance is impossible. Tribes will also be invited to the pre-construction survey.		The response only mentions archeological value and not cultural value. In addition, the response does not address the indirect vs. direct portion of the comment.	This comment and the responses were discussed at the December 17-18, 2013 TWG meeting.	Not applicable
265b	Hualapai-30 Chemehuevi-30 Cocopah-30 CRIT-30	Table 6.1-1 p. 6-21	CUL-1a-10	Regarding certain impacts on the Topock Maze (e.g., noise, aesthetics, etc.) and the associated sacred area, the 60% BOD report states, as did the 30% BOD report, that "prevention of indirect impacts to the Maze will be incorporated into the design to the maximum extent feasible as determined by DTSC". Where is the process spelled out for such a	See response to comment #265a FMIT-41.	See response to comment #265a FMIT-41.				Not applicable

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				determination by DTSC?						
266	DOI-108	Table 6.2-1, Chemical-Specific (Item Numbers 1, 2, 3, 52, 53, and 55), Pages 6-45 through 6-48	Which existing/future document(s) will document continued compliance with this ARAR?	The column is empty for these ARARs. It is likely that the following documents will fulfill this action: 1) routine groundwater monitoring data; 2) influent-effluent data; 3) groundwater elevation monitoring data within extraction, injection, and monitoring wells; 4) contaminant mass balance removal calculations; 5) percent system is operational on a monthly basis; 6) annual system operational and effectiveness report; and 7) annual capture zone analysis report. Other data/reports may also be generated that would likely fulfill this requirement.	Exhibit L2.2-4 of the O&M Manual (Section L3.3) includes a proposed template and outline for quarterly progress reports during remedy O&M, as required by the 2013 CD (Section X and Appendix C) and the 1996 CACA (Attachment 7). The proposed outline includes all elements listed in this comment. PG&E assumes that, for efficiency, the monthly operational information listed under Item #5 will be reported on a quarterly basis in the quarterly reports, i.e., not in separate reports. Text will be added to this column to indicate the future documents for compliance with the ARARs.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Table 6.2-1, Chemical-specific ARARs (Item #s 1, 2, 3, 52, 53, and 55).
267	MWD-7	6.2-1, Table 6.2-1, Item No. 3	The remedy is designed to prevent migration of contaminants to the Colorado River that would result in an exceedance of applicable water quality standards."	This should read "The remedy is designed to prevent migration of contaminants to the Colorado River that would result in an exceedance of applicable water quality standards, including federal, California, and Arizona standards."	Comment noted. Text will be revised as suggested.				Comment resolved.	90% BOD Table 6.2-1, Item #3.
268	DOI-109	Table 6.2-1, Item Number 32, Page 6-48	Action (60% Design Report Compliance Status) column – ". . . the results will be summarized in a forthcoming report for DTSC review."	The federal agencies should be included in the review as well.	Comment noted. The draft Wetlands Delineation Report was submitted to DTSC and DOI on August 22, 2013.		Comment resolved.		Comment resolved.	Not applicable
269	DOI-110	Table 6.2-1, Item Number 40, Page 6-50	Triggering Event column – "Expiration of existing PBA (end of 2012) . . . "	The Triggering Event column should be updated.	The triggering event column will be revised to state (underline typeface is added text, ~~strikethrough~~ typeface is deleted text): "Extension of existing PBA ~~(end of 2012)~~ through December 31, 2017 or construction of the remedy, whichever is sooner."		Comment resolved.		Comment resolved.	90% BOD Table 6.2-1, Item #40.
270	DOI-111	Table 6.2-1, Item Number 45, Page 6-51		The Triggering Event should also consider construction of any future replacement wells in Arizona, if necessary.	The triggering event column will be revised to state (underline typeface is added text, ~~strikethrough~~ typeface is deleted text): "During project design and ~~before~~ construction of wells in Arizona".		Comment resolved.		Comment resolved.	90% BOD Table 6.2-1, Item #45.

TABLE I-1

Response to Comments on Basis of Design Report/Intermediate (60%) Design

Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design

PG&E Topock Compressor Station, Needles, California

Item	Comment Number	Section/ Page	Reference Text	60% Design Comment	PG&E Response to 60% Design Comments	DTSC Response to 60% Design Comments	DOI Response to 60% Design Comments	Tribe Response to 60% Design Comments	Final Comment Resolution	Where responses are reflected in the 90% design documents?
271	DOI-112	Table 6.2-1, Item 13, Page 6-66		References to the CDFW 2013 source do not include the year.	See response to comment #255 DOI-104.		Comment resolved.		Comment resolved.	90% BOD Section 9.
272	DOI-113	Table 6.2-1, Item Number 14, Page 6-67	Action (60% Design Report Compliance Status) Column	It should be noted in the last column that the action to be taken by PG&E involves the implementation of measures identified in the PA and CHPMP, and through ongoing consultation activities with the Tribes that will avoid, mitigate, or otherwise minimize adverse effects from the undertaking.	The following text will be added to the last column of Table 6.2-1 for Item 14 after "Requirements in the PA and the CHPMP will be adhered to": "<u>These requirements include implementation of mitigation measures identified in the PA and the CHPMP and through ongoing consultation activities with the Tribes that will avoid, mitigate, or otherwise minimize adverse effects from the undertaking.</u>"		Comment resolved.		Comment resolved.	90% BOD Table 6.2-1 Item 17.
273	FMIT-42	Table 6.2-1		The Tribe disagrees with the conclusions regarding Item No. 39 (RFRA) and Item No 22 (AIRFA). There is no question in the Tribe's mind that the project burdens the traditional religious practices of the Tribe. The issue is not merely defined by physical access concerns. The Actions should more fully reflect the breadth of the statutes and the projects impacts on the Tribe. The Tribe is also concerned about Item No. 14 (NHPA). The Action described appears to be mostly about producing documents. Action should also focus on process inclusion of the Tribe. It should also reflect that Treatment Measures may evolve as the design evolves.	PG&E defers to DOI.		In specific reference to Item 39 (RFRA), the federal courts have held that the requirement not to impose a substantial burden on the exercise of traditional religious practices is violated "only when individuals are forced to choose between following the tenets of their religion and receiving a governmental benefit or coerced to act contrary to their religious beliefs by the threat of civil or criminal sanctions." Based on this judicial interpretation of the law, DOI has concluded that the groundwater remedy does not present a substantial burden on the exercise of traditional religious practices. However, DOI and BLM acknowledge that many of the Tribes feel that the remediation project does impact religious and cultural practices in the Topock area. One effort made to address this concern was DOI and BLM's development of the Tribal Access Plan to assure the Tribes of	Under further tribal review.	This comment and response were discussed at the February 11, 2014 TWG meeting.	Not applicable

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							continued access to federal lands contained within the boundary of the APE. The provision of tribal access to property for religious, spiritual or other cultural purposes is consistent with both RFRA and AIRFA. DOI and BLM will continue to consult with the Tribes in an effort to identify and implement mitigation measures that will prevent or mitigate impacts on the ability of Tribal members to exercise traditional cultural and religious activities associated with the Topock area. The documents referenced under "Action", including the PA and the CHPMP, are the result of the ongoing consultation efforts with the Tribes and serve to memorialize the collaborative decisions made during these meetings.			
274	MWD-8	6.2-1, Table 6.2-1, Item No. 52	"There is no state MCL for Cr(VI)..."	This should read 'There is currently no state MCL for Cr(VI), although the California Department of Public Health has been ordered to propose an MCL for Cr(VI) by August 31, 2013. When the final MCL for Cr(VI) has been set, this item will be revised as necessary. In the meantime, the RAO has been established..."	Text will be revised as follows: "There is currently no state MCL for Cr(VI), although the California Department of Public Health has proposed a draft MCL of 0.010-milligram per liter for Cr(VI). This statement regarding the state MCL for Cr(VI) will be revised as necessary when a final MCL is issued. The RAO has been established based on the regional background concentration of 32 µg/L at the conclusion of remedy implementation."				Comment resolved.	90% BOD Table 6.2-1 Item #52.
275	MWD-9	6.2-1, Table 6.2-1, Item No. 99	"There are no MCLs or MCLGs for Cr(VI)..."	This should read "There are currently no MCLs or MCLGs for Cr(Vl), although the California Department of Public Health has been ordered to propose an MCL for Cr(VI) by August 31, 2013. When the final MCL for Cr(Vl) has been set, this item will be revised as necessary. In the meantime, the RAO of 32 ug/L..."	See response to comment #274 MWD-8.				Comment resolved.	90% BOD Table 6.2-1 Item #99.

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276	DOI-114	Table 6.2-2, Item Number 4, Stipulation I(D) Page 6-72 And Table 6.2-3, Page 6-77		The compliance status addresses the stipulation in part. The language contained within this section specifies that “If adverse effects to such properties are unavoidable, PG&E, under the direction of BLM, will develop and follow procedures that reduce the possibility of inadvertent damage.” It is our expectation that proactive measures will be included in the Remedial Action Work Plan to reduce the potential for inadvertent damage, including those listed in Section 6.6.3 of the CHPMP.	Comment noted, although PG&E notes that it appears that this comment applies to Item No. 4 of Table 6.2-3 only and not Item No. 4 of Table 6.2-2, which relates specifically to restoration. PG&E will describe steps to prevent or reduce the potential for inadvertent damage in the Remedial Action Work Plan.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Table 6.2-3 Item #4.
277	FMIT-43	Table 6.2-2		Stipulation 18. The Tribe believes that a solid draft plan and not merely an outline of the IM3 decommissioning and restoration plan should be produced prior to the groundwater remedy.	PG&E understands that the FMIT’s comment is focused on Section 8 of the Draft IM-3 Decommissioning, Removal, and Restoration Work Plan (“Draft Plan”), which sets forth a general approach for IM-3 Site restoration. In brief, Section 8 of the Draft Plan includes restoration guidelines (steps to be followed during restoration), elements of the restoration of habitat and revegetation and demobilization, and a draft annotated outline of a future more detailed, site specific IM-3 Restoration Plan. In coordination with the FMIT and other tribes, PG&E will develop a schedule for developing the more detailed Restoration Plan The schedule will be tailored to provide a timely plan with additional detail on the restoration process, and avoid delay so that restoration will commence shortly after decommissioning is completed. PG&E anticipates that some details of the restoration plan, in particular the amount of earthwork and earth movement involved in the restoration, will be deferred to the completion of decommissioning, so that PG&E and the Tribes can evaluate which approach may minimize further disturbance (and may minimize the amount of earth movement) while achieving the required restoration. PG&E believes that specific determination can best be made when the condition of ground surface is known, following the removal of the IM3 facilities.				In addition to discussions at the TWG, PG&E’s response was discussed with the FMIT, and revised in response to that discussion.	Draft IM-3 Decommissioning, Removal, and Restoration Work Plan, Section 1.1, last paragraph.

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278	DOI-115	Table 6.2-3, Page 6-77, Item Number 6		The CHPMP supersedes the CRMP. A description of the proposal describing a program of periodic site monitoring and condition assessment shall be provided by PG&E.	Comment noted. A program for periodic site monitoring and condition assessment will be proposed concurrent with the 90% design.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Table 6.2-3 Item #6.
Specific Comments – Section 7										
279	DTSC-113	Section 7.3.1, p.7-5, 3b	Establish IRZ cut-off as quickly as possible	Please clarify what is meant by this evaluation criterion.	The evaluation criteria of establishing an IRZ cut-off is to establish a continuous front of carbon distribution along the NTH IRZ to develop reducing conditions in order to actively reduce Cr(VI) in groundwater. Text will be clarified for better description.	Okay pending review of the additional text.			Comment resolved.	90% BOD Section 7.3.1 Item #3b.
280	DOI-116	Section 7.3.2, Page 7-6, 1st bullet (Scenario 1A)		It is not clear whether FW-1 and FW-2 are operational with “Freshwater Injection ON”; please clarify.	For the "Freshwater Injection ON" steps, FW-1 and FW-2 are both operational. Footnote "4" will be updated to clarify that these two wells are active.		Comment resolved.		Comment resolved.	90% BOD Section 7.3.2, Footnote 9.
281	DOI-117	Section 7.3.2, Page 7-6	“Simulate Cr(VI) transport for Scenarios 1A and 2A are shown in Figure 7.3-1 . . . “	Please clarify why only Model Layers 2 and 4 were modeled and not all layers.	All model layers were simulated in all groundwater flow and solute transport model runs. In many cases only Model Layers 2 and 4 were presented in an effort to condense the number of figures presented. Model Layers 1 and 2 represent the shallow portion of the aquifer and have similar plume footprints, so Model Layer 2 was utilized as a representative of the shallow aquifer as the simulated results in Model Layers 1 and 2 were similar. Model Layers 3 and 4 represent the deep portion of the aquifer and have similar plume footprints so Model Layer 4 was utilized as a representative of the deep aquifer as the simulated results in Model Layers 3 and 4 were similar. Text will be included in the 90% BOD to reflect this response.	Include/ summarize the provided response in the 90% BOD report.	Comment resolved.		Comment resolved.	90% BOD Section 7.3.2. 90% BOD Apdx B Section 7.4,
282	DOI-118	Section 7.3.2, Page 7-7	“Based on these results, a shorter, 1-year start-up is preferred . . . .”	The text in this section discusses the options of either the 1 year start-up schedule or the 2 year start-up schedule. DOI supports the implementation of the 1 year start-up process based on the assumption that the sooner the system is fully operational the sooner PG&E and the agencies/ stakeholders will gain an understanding of how the system operates under current conditions.	DOI’s preference is noted.		Comment resolved pending review of the 90% design.		Comment resolved.	Not applicable

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283	DTSC-114	Section 7.3.3, p.7-7, last paragraph	The downside of complete shutdown of the IM system upon final groundwater remedy start-up is that the hydraulic control exerted by the IM pumping would end. From a hydrogeologic perspective, this is not a significant concern due to the slow migration rate and the presence of the reducing rind.	Although the hydraulic gradient is flat, depending on the time of year, if the implementation is during the low river stages, the hydraulic movement would be significantly higher toward Arizona. Also, would PG&E's conclusion still be true with nine months of reductant injection at IRZ and minimum three months of freshwater injection? DTSC is concerned that this approach would allow a slug of Cr(VI) to be pushed towards Arizona, even if it is protective of river water.	Seasonal variations in river stage will result in localized variations in flow velocity but the long term trends will still be consistent with average flow velocities. PG&E's conclusion is still true with nine months of NTH IRZ operation and 3 months freshwater injection as Scenarios 1A (6 month NTH IRZ and 3 month freshwater injection) and 1B (12 month NTH IRZ and 6 month freshwater injection) bracket this timeframe. Even with the longer transitional operation times described in Scenario 1B, simulation results indicate that a slug of Cr(VI) will not be pushed towards Arizona and will still be within the simulated hydraulic capture zone of the River Bank Extraction Wells when they are activated.	Comment resolved.			Comment resolved.	Not applicable
284	DOI-119	Section 7.4, Page 7-8	"In response to the FMIT's comment on the 30% design . . . "	The IM-3 Decommissioning Plan and the Remedial Action Work Plan are included as part of the DOI/PG&E Consent Decree and therefore subject to review and approval by DOI. DOI concurrence on the shutdown of IM-3 is also expected. The text in the paragraph should reflect this.	Text in this paragraph will be revised as follows (inserted verbiage shown in <u>underline</u> typeface): "In response to the FMIT's comment on the 30% design (HA-GC2 and HA-29) and as directed by DTSC, the following procedures and criteria for DTSC's <u>and DOI's</u> determination that the remedy is maintaining plume control and that IM-3 decommissioning can be approved are presented below for review by project stakeholders and Tribes during the design phases and approval by DTSC <u>and DOI</u> as part of the Construction/ Remedial Action Work Plan."		Comment resolved.		Comment resolved.	90% BOD Section 7.4, 1st paragraph.
285	DOI-120	Section 7.4, Page 7-8, Plume Control Criteria	" . . . within the EIR project area, as defined in the EIR and as shown in EIR Exhibit 3-2, . . . "	It is unclear why the text specific to the EIR is included.	The Plume Control Criteria set forth in the 60% BOD are the same as those in the settlement agreement between the Fort Mojave Indian Tribe and DTSC.		Comment resolved.		Comment resolved.	Not applicable
286	DOI-121	Section 7.4, Page 7-9	"The IM-3 system shall be turned off when the groundwater remedy	The IM-3 Decommissioning Plan is included as part of the DOI/PG&E Consent Decree and the Programmatic Agreement and is subject to DOI review and approval. We do, however, acknowledge that	The text referenced by this comment reflects the terms of the settlement agreement between the FMIT and DTSC. The text will be revised by adding the following sentence to Section 7.4 to clarify this (before		Comment resolved.		Comment resolved.	90% BOD Section 7.4, 1st paragraph.

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			equipment and facilities are in place and ready to start-up. The remedy equipment and facilities may include the NTH IRZ wells, the River Bank Extraction Wells, the freshwater wells, monitoring wells, the East Ravine/TCS wells, and the pipelines, controls, and electrical and mechanical systems needed to operate these wells. DTSC will issue to PG&E a written approval of the decommissioning of IM-3 directing PG&E to implement the DTSC and DOI-approved IM-3 decommissioning plan no later than 30 days after the following three items have occurred: a) DTSC determines that the groundwater remedy is achieving plume control; b) DTSC determines that the groundwater remedy is Operating	only DOI concurrence on DTSC's decision for the timing of IM-3 decommissioning is necessary. The text in this paragraph and subsequent items is confusing concerning authority with respect to acceptance of the remedy, acceptance of shutdown of IM-3, and the approval of the IM-3 Decommissioning Plan. Specific to item b in this section, the remedy must be determined concurrently by DOI, (as the CERCLA lead), and DTSC to be functioning properly and performing as designed for DOI to consider the remedy "operational and functional" in accordance with the NCP 300.435(f)(2) and DTSC to determine that the remedy is "Operating Properly and Successfully".	"Plume Control Criteria"): "<u>These procedures and criteria are set forth in the 2012 Settlement Agreement between the FMIT and DTSC.</u>" Additionally, PG&E understands that DOI must determine that the remedy is functioning properly and performing as designed for DOI to consider the remedy "operational and functional" in accordance with NCP 300.435(f)(2). The text will be revised to acknowledge this by adding the following sentence before the last sentence of Section 7.4: "<u>Additionally, with respect to step (b) above, DOI must concurrently determine the remedy to be functioning properly and performing as designed for DOI to consider the remedy "operational and functional" in accordance with the NCP 300.435(f)(2).</u>"					

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			Properly and Successfully (OPS) (unless DTSC determines, at its lawful discretion, that such decommissioning can occur prior to DTSC's OPS determination); and C) After DOI concurs with the decommissioning of IM-3, DTSC shall issue to PG&E a written approval of the decommissioning of IM-3 directing PG&E to implement the DTSC- and DOI-approved IM-3 Decommissioning Work Plan.”							
287	MWD-10	7.4/ 7-8 to 7-9	Phasing Alternatives/ Transition from Interim Measure to Final Remedy	Text indicates DTSC will approve decommissioning of IM-3 facilities based on, among other thing, the groundwater remedy Operating Properly and Successfully (OPS), unless DTSC determines decommissioning can occur prior to OPS. Is this discretionary disclaimer necessary? The decommissioning plan, to be submitted at the 90% Design, should not recommend decommissioning the IM-3 facilities until established metrics for the remedy criteria are met.	The text referenced by this comment reflects the terms of the settlement agreement between the FMIT and DTSC. In accordance with the agreement, the decommissioning plan will not recommend decommissioning of the IM-3 facilities until the Plume Control Criteria are met and DTSC determines that the groundwater remedy is achieving plume control, DOI determines that the remedy is operational and functional, and DOI concurs with DTSC’s determination to decommission IM-3. The settlement agreement also provides, however that “DTSC' s determination of Plume Control . . . must be made concurrent with or after DTSC's OPS determination, ***unless DTSC in its lawful discretion, decides that decommissioning of IM-3 can occur prior to DTSC's OPS Determination;*** and DOI must concur with DTSC's	Because of the Tribal sensitivity of the IM-3 treatment plant location, DTSC may consider timing of the decommissioning activities in advance of OPS determination when the remedy demonstrates reasonable success but with clear evidence of protection of the Colorado River. However, DTSC will provide notice to all stakeholders of the intent to decommission the IM-3 plant prior to approval to implement the IM-3 decommissioning plan defined in the final remedy design (to be submitted with 90% design).			Comment resolved.	Not applicable

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					decision to decommission IM-3." (emphasis added).					
288	DOI-122	Section 7.6, Page 7-10	"Figure 7.6-1 shows a preliminary map of all temporary equipment staging areas and the yard, . . . "	According to the text, only a subset of the areas shown in Figure 7.6-1 would be used as staging areas. Recommend including a rectangle under the Notes for this figure depicting the area actually needed for staging, and identify the acreage. This information will be useful in evaluating selection of areas for staging.	Figure 7.6-1 has been revised to show acreage for the potential equipment staging and soil storage areas (see **Attachment G**, at the end of this table).		Comment resolved.		Comment resolved.	At this 90% stage, the full content of Section 7.6 (including Figure 7.6-1) has been incorporated into the Construction/Remedial Action Work Plan, where constructed related elements are presented in detail. See Section 4 and Figure 4-5 of the Construction/Remedial Action Work Plan for details.
289	DOI-123	Figure 7.6-1		Based on input from the Hualapai, Cocopah, Chemehuevi, Quechan, CRIT and Fort Mojave Indian Tribes, and considering the additional activity in the Refuge and adjacent to the Topock Maze, DOI requests that the BOR Quarry and former evaporation pond area no longer be considered as options for staging or soil storage during the groundwater remedy implementation. Additionally, BLM and San Bernardino County have discussed the potential use the OHV staging area within Park Moabi as a potential storage location for excess soil. PG&E has engaged with the County regarding the remedy and the use of similar areas around Park Moabi and should include this area as an option.	Figure 7.6-1 has been updated to remove the BOR Quarry and former evaporation pond area as options for staging or soil storage, and to add the OHV staging area within Park Moabi as a potential storage location for excess soil (see **Attachment G**, at the end of this table). In addition, the Old Gravel Pit/Current Paint Ball area was added as a potential soil storage area for evaluation.		Comment resolved pending review of 90% design.		Comment resolved.	At this 90% stage, the full content of Section 7.6 (including Figure 7.6-1) has been incorporated into the Construction/Remedial Action Work Plan, where constructed related elements are presented in detail. See Section 4 and Figure 4-5 of the Construction/Remedial Action Work Plan for details.
290	DTSC-115	Figure 7.6-1	Proposed staging areas, construction yard and access routes	Please note that environmental impacts have not been fully evaluated for the use of any staging areas outside of the final EIR project boundary.	The proposed staging areas are all located within the APE, and as noted in the EIR, the entire area of the APE was studied for impacts such as impacts to biological resources (see Final EIR exhibit 4.3-1 showing entire APE as biological study area) and impacts to cultural resources (see Final EIR exhibit 4.4-1 showing entire APE as cultural resources study area). The EIR states in the project description that staging areas would typically be located in areas that are already developed or disturbed, and that staging areas could be anywhere within the project area as shown in the EIR. (Final EIR, p. 3-21). All but three of the proposed staging areas are within the EIR project area. With respect to these three proposed staging areas, they are all located within the APE which was evaluated for impacts to biological	The proposed CEQA impact conclusion by PG&E may very well be appropriate; however, this formal analysis within the CEQA context for the three areas outside of the current project boundaries has not been conducted. PG&E's response is noted.		The Tribes request to be involved in any future cultural studies.	Comment and responses noted.	Not applicable.

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					and cultural resources, and they consist of areas that have been previously developed or disturbed, consistent with the statement in the EIR project description. PG&E understands and anticipates that the use of these areas for staging would be evaluated as part of DTSC's CEQA evaluation of the final design. PG&E also anticipates that this review will demonstrate that the use of these areas does not involve new or substantially more severe environmental impacts compared to the evaluation in the Final EIR, given that the areas are previously developed or disturbed and have already been evaluated for impacts to cultural and biological resources.					
291	FMIT-44	Figure 7.6-1		The Tribe and PG&E appear to disagree about the timing of the DTSC-required restoration of the prior IM3 parking area. The Tribe believes that the directive from former DTSC Director Blevins remains in place, requiring the immediate restoration of that area. The settlement agreement between FMIT and PG&E could not override DTSC's direction. The Tribe objects to that area being proposed as a staging area in the design.	PG&E agrees with DTSC's interpretation that B.B. Blevins' March 8, 2005 letter regarding restoration of the staging area has been superseded by the settlement agreement between DTSC and the FMIT. In addition, the 2006 settlement agreement between PG&E and the FMIT, which addresses restoration of the IM-3 Site, also supersedes the prior direction in the 2005 letter. That settlement agreement states "upon decommissioning of the IM-3 treatment plant, PG&E will work in consultation with the Tribe to restore the IM-3 Site to pre-existing conditions to the maximum extent practicable, subject to the continued use of remedial facilities" and requires PG&E to consult with the FMIT regarding a plan for restoration of the IM-3 Site. (2006 Settlement Agreement § VII(A)(1).) The 2006 settlement agreement's provisions regarding restoration encompass the entire IM-3 Site, including the staging area. Section XII(H) of the 2006 settlement agreement expresses its intent to supersede other documents concerning the same subject matter: "This agreement supersedes all prior or written agreements, negotiations, discussions, understandings and representations between the Settlement Parties hereto and/or their respective counsel with respect	Comment noted regarding Tribe's objection to that area being proposed as a staging area in the design. See RTC #776 for related discussions of construction staging areas. DTSC wants to clarify its position regarding the March 8, 2005 Director Blevins' letter directing PG&E to meet certain timing deadlines for restoration of the IM3 staging area. DTSC believes that the 2006 Settlement Agreement between FMIT and DTSC supersedes Director Blevins' 2005 letter. Various sections of the Agreement, including paragraph V.M., that states that this "Agreement supersedes all prior oral or written agreements…between the parties hereto…." supports this position.			PG&E and the FMIT have discussed this comment and its response to the Tribe's comment.	Not applicable

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					to the subject matters covered hereby.". . .					
Specific Comments – Section 8 (Cost Estimate)										
292	DTSC-116	Section 8		As stated, PG&E is required to update the financial assurance annually for the life of the project. DTSC is unaware of any financial assurance update since the April 5, 2011 approval by DTSC.	PG&E agrees that annual updates to financial assurance are required. PGE has provided a copy of the most recent financial assurance submittal dated March 28, 2013 to DTSC Topock project staff.	Okay. DTSC has accepted the 2013 FA filing.			Comment resolved.	Not applicable
293	DOI-124	Exhibit 8-1		No back-up is provided.	Appendix H (Updated Cost Estimate) contains the detailed cost estimates including basis of estimate, assumptions, etc.		Comment resolved.		Comment resolved.	90% BOD Appendix H.
294a	FMIT-45	Exhibit 8-1 p. 8-1	*"Post-Remediation Deconstruction, Year 41"*	The updated cost estimate for this project includes estimated costs for "deconstruction". We understood that the timing of the remedy decommissioning plan would be near the end of the remediation time period. If so, then what assumptions were used to estimate these "deconstruction" costs?	Attachment E of Appendix H (pages 3419-3426 of the 60% BOD PDF) presents the assumptions used to estimate the deconstruction costs.			Comment resolved.	Comment resolved.	90% BOD Appendix H.
294b	Hualapai-31 Chemehuevi-31 Cocopah-31 CRIT-31	Exhibit 8-1 p. 8-1	*"Post-Remediation Deconstruction, Year 41"*	The updated cost estimate for this project includes estimated costs for "deconstruction". We understood that the timing of any decommissioning plan would be near the end of the remediation time period. If so, then what assumptions were used to estimate these "deconstruction" costs?	See response to comment #294a FMIT-45.			Comment resolved.	Comment resolved.	90% BOD Appendix H.
Specific Comments – Appendix A4-A7 (Plants Survey Methodology Technical Memoranda and Plant Survey Reports)										
295	DOI-126	Appendix A4, Mature Plants Survey Report Page 6:		Salt cedar and Athel tamarisk are both described. There is no mention of Athel as an upland species, as found in the FWIP. These reports should be consistent. In describing salt cedar remove the following text, "DeLoach et al. (2000) have characterized the invasion of salt cedar as "one of the worst ecological disasters to impact riparian ecosystems of the United States displacing native plants, degrading wildlife habitat, and causing the decline of the threatened and endangered species"". Sher and Quigley (2013) challenge this representation and provide research to support it. Sher, Anna &Martin F. Quigley (ed). 2013. Tamarix: A case study of	The Mature Plants Survey Report is currently being revised. There was an attempt by the botanists to differentiate species of tamarisk found at the site (Tamarix ramosissima and T. aphylla). T. aphylla can be found in floodplains - text in the Mature Plants Survey Report will be revised to reflect that it is not entirely confined to uplands.		Comment resolved.		Comment resolved.	See the May 19, 2014 *Addendum to Mature Plant Survey Report for the PG&E Topock Compressor Station* included in Appendix A4 of the 90% BOD.

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				ecological change in the American West. Oxford University Press. New York, NY.						
296	DOI-127	Appendix A4, Mature Plants Survey Methodology, Page 7 of 7	References	The second and sixth references on the list are the same citation. Please revise.	Comment noted. Revising previously published documents for the sole purpose of revising reference list is however not warranted and not recommended. No changes are proposed.		Comment resolved.		Comment resolved.	Not applicable
297	DOI-128	Appendix A4, Mature Plants Survey Methodology, Page 7 of 7	References	The following items are included on the Reference list but are not referenced in the text: CH2M HILL 2005, Holland R. F. 1976, and Jepson Flora Project, 2010.	Comment noted. Revising previously published documents for the sole purpose of updating in-text citation is however not warranted and not recommended. No changes are proposed.		Comment resolved.		Comment resolved.	Not applicable
298	DOI-129	Appendix A4, Floristic Survey Methodology, Page 19 of 22	Field Surveys	CNPS (2001) was referenced in text. This reference format does not match that shown in the reference list. Please correct.	The reference format will be corrected.		Comment resolved.		Comment resolved.	Revising Appendix A4 for the sole purpose of revising reference format is not warranted. Therefore, no changes were made.
299	DOI-130	Appendix A4, Floristic Survey Methodology, Page 20 of 22	References	The following items are included in the Reference list but are not referenced in the text: CDNPA, 1981; CH2M HILL 2005; CH2M HILL 2007; Jepson Online Interchange (2011); SEINet, 2011; and USFWS 2000.	Comment noted. Revising previously published documents for the sole purpose of updating in-text citation is however not warranted and not recommended. No changes are proposed.		Comment resolved.		Comment resolved.	Not applicable
300	DOI-131	Appendix A4, Mature Plants Survey Report, Page 7	Hillside palo verde	The in-text citation reads "California Consortium of Herbaria" while in the reference section it is listed as "Consortium of California Herbaria".	Comment noted.		Comment resolved.		Comment resolved.	Not applicable
301	FMIT-46 Hualapai-32 Chemehuevi-32 Cocopah-32 CRIT-32	Append A4	Technical Memoranda on Methodologies of Mature Plant Survey and Floristic Survey and the Mature Plants Survey Report	The Tribes requested that plant survey include the entire EIR project area. Now that this project area has been expanded based on a recent archeological survey conducted in the Spring 2013 is an addendum needed for the plant surveys to ensure that all of the plants within the new EIR project boundary have been properly accounted?	PG&E is updating the Mature Plants Survey report to include results from the Spring 2013 survey that covered the freshwater source implementation area, target for submittal is Q4 2013.			Comment resolved pending submittal of the Mature Plants Survey report.	Comment resolved. The revised Floristic Survey Report was submitted to DTSC and DOI on December 30, 2013, and included the Spring 2013 survey results of the freshwater evaluation areas in Arizona. In addition, the Ethnobotany Survey Report was also updated to include Spring 2013 survey results of the freshwater evaluation areas in Arizona, and submitted to DTSC and DOI on January 17, 2014.	See the May 19, 2014 *Addendum to Mature Plant Survey Report for the PG&E Topock Compressor Station* included in Appendix A4 of the 90% BOD.
302	FMIT-47 Hualapai-33 Chemehuevi-33 Cocopah-33 CRIT-33	Append A4 Memo p. 2 of 7	*The survey area encompasses the Project Area, totals approximately 780 acres, and varies in*	Does the plant survey cover the areas that will be included in the expanded APE due to the pending decision on freshwater source implementation?	PG&E is updating the Mature Plants Survey report to include the Spring 2013 survey that covered the freshwater source implementation area, target for submittal is Q4 2013.			Comment resolved pending submittal of the Mature Plants Survey report.	Comment resolved. The revised Floristic Survey Report was submitted to DTSC and DOI on December 30, 2013, and included the Spring 2013 survey results of the freshwater evaluation areas in	See the May 19, 2014 *Addendum to Mature Plant Survey Report for the PG&E Topock Compressor Station* included in Appendix A4 of the 90% BOD.

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			elevation from approximately 400 to 700 feet above sea level.						Arizona. In addition, the Ethnobotany Survey Report was also updated to include Spring 2013 survey results of the freshwater evaluation areas in Arizona, and submitted to DTSC and DOI on January 17, 2014.	
303	DOI-132	Appendix A5, Section 1, Page 1-1		The in-text citation for DTSC, 2011 is not listed in the Reference section.	Comment noted. The missing reference will be added.		Comment resolved.		Comment resolved.	See the December 30, 2013 *Topock Groundwater Remediation Project Revised Floristic Survey Report* included in Appendix A5 of the 90% BOD.
304	DOI-133	Appendix A5, Section 4.3, Page 4-3	"The surveys were floristic and comprehensive in nature…".	The in-text citation for Jepson Online Interchange, 2011 in this section is different than the in-text citation found on Page 5-2.	Comment noted. The in-text citation will be revised.		Comment resolved.		Comment resolved.	See the December 30, 2013 *Topock Groundwater Remediation Project Revised Floristic Survey Report* included in Appendix A5 of the 90% BOD.
305	DOI-134	Appendix A5, Section 5.4, Page 5-3		The in-text citation for DTSC, 2011 is not listed in the Reference section.	Comment noted. The missing reference will be added.		Comment resolved.		Comment resolved.	See the December 30, 2013 *Topock Groundwater Remediation Project Revised Floristic Survey Report* included in Appendix A5 of the 90% BOD.
306	DOI-135	Appendix A5, Section 6, Page 6-1		The following items are included in the Reference list but are not referenced in the text: Calflora, 2012; and USFWS 2000.	Comment noted. The references will be deleted.		Comment resolved.		Comment resolved.	The subject items are retained on the Reference list because: 1) USFWS 2000 was referenced in Section 4.5, 1st sentence. 2) Calflora 2012 was referenced in Appendix A (page 45 of the PDF).
307	DOI-136	Appendix A5, Section 6, Page 6-1		The citation for "Southwest Environmental Information Network, SEINet. 2011." should be revised to "Southwest Environmental Information Network (SEINet). 2011."	Comment noted. The citation text will be revised.		Comment resolved.		Comment resolved.	See the December 30, 2013 *Topock Groundwater Remediation Project Revised Floristic Survey Report* included in Appendix A5 of the 90% BOD.
308	DOI-137	Appendix A5, Appendix F, Page F-1	"Under Mitigation Number CUL-1a-5 in the mitigation monitoring and reporting program . . . "	The in-text citation for DTSC, 2011 is not listed in the Reference section.	Comment noted. The missing reference will be added.		Comment resolved.		Comment resolved.	See the December 30, 2013 *Topock Groundwater Remediation Project Revised Floristic Survey Report* included in Appendix A5 of the 90% BOD.
309	DOI-138	Appendix A5, Appendix F, Page F-1	Mitigation for Special-status plants	The in-text citation for Baldwin et al. 2012 is not listed in the Reference section.	Comment noted. The missing reference will be added.		Comment resolved.		Comment resolved.	See the December 30, 2013 *Topock Groundwater Remediation Project Revised Floristic Survey Report* included in Appendix A5 of the 90% BOD.
310	DOI-139	Appendix A6, Page 6	References	The following item is included in the Reference list but is not referenced in the text: CDFG 2012.	Comment noted. Revising previously published documents for the sole purpose of updating in-text citation		Comment resolved.		Comment resolved.	Not applicable

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					is however not warranted and not recommended. No changes are proposed.					
311	DOI-140	Appendix A-7, Ethnobotany Survey Report.	General Comment	Is Lycium considered an ethnobotanical or culturally significant? Anderson's desert thorn (Lycium andersonii) is only mentioned on page 2-1 as a component of the Blue palo verde woodland community, but is not listed as a plant in the EIR Appendix PLA. It produces edible berries and may have been used as a food source.	Culturally significant plants for the survey of culturally significant plants were those species that were included in Appendix PLA of the Final EIR. PG&E will survey for Lycium and include the survey results in the 90% BOD.		Comment resolved pending review of 90% design.		Comment resolved.	See the February 28, 2014 *Supplemental Ethnobotanical Plant Surveys for the PG&E Topock Compressor Station* included in Appendix A7 of the 90% BOD.
312	DOI-141	Appendix A-7, Appendix A: Target List of Culturally Significant Plant Species from Appendix PLA of the EIR with the Potential to Occur in the Project Area		Arrowweed is not identified as a plant of cultural significance in this report but it should be.	Comment noted. Surveys for culturally significant plants included only those species that were included in Appendix PLA of the Final EIR; Arrowweed was not included on this list. See response to comment #83 DOI-34. PG&E will survey for Arrowweed and include the survey results in the 90% BOD.		Add a footnote to Figure 2.4-11 noting that the tribes have recently (June 2011) stated that Arrow weed is an ethnobotanical plant. Comment resolved pending review of 90% design.		The following note will be added to Figure 2.4-9 and similar maps in the 90% BOD: "Tribes have stated that Arrow weed is an ethnobotanical sensitive plant (June 2011). Arrow weed however is not on the Appendix PLA of the FEIR. Arrow weed will be protected during construction as a mature plant under AES-1a".	See the February 28, 2014 *Supplemental Ethnobotanical Plant Surveys for the PG&E Topock Compressor Station* included in Appendix A7 of the 90% BOD.
313	DOI-142	Appendix A-7, Ethnobotany Survey Report. Section 2.1.2, Page 2-1	Tamarisk thicket is primarily found on the low sandy terraces adjacent to the Colorado River and Park Moabi Slough. This vegetation type is also found near the terminus of the larger ephemeral washes associated with the dissected terraces south of the Colorado River'. (Same text appears in the Final Floristic Survey Report, Section 2.1.2, page 2-1)	Athel tamarisk is described. There is no mention of Athel as an upland species, as found in the FWIP. These reports should be consistent.	The Ethnobotany Survey Report is currently being revised. There was an attempt by the botanists to differentiate species of tamarisk found at the site (Tamarix ramosissima and T. aphylla). T. aphylla can be found in floodplains - text in the report will be adjusted to reflect that it is not entirely confined to uplands.		Comment resolved.		Comment resolved.	See the January 15, 2014 *Topock Groundwater Remediation Revised Ethnobotany Survey Report* included in the Appendix A7 of the 90% BOD.
314	DOI-143	Appendix A7, Section 4.2, Page 4-1		The in-text citation for USFWS 2011 is not listed in the Reference section.	Comment noted. The in-text citation will be added to the reference list.		Comment resolved.		Comment resolved.	The January 15, 2014 *Topock Groundwater Remediation Revised Ethnobotany Survey Report* did not cite USFWS 2011;

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										therefore, that citation is not included in the Reference list.
315	FMIT-48 Hualapai-34 Chemehuevi-34 Cocopah-34 CRIT-34	Append A7 Section 5.3 p. A7-5-3	*Additional floristic surveys will be completed in the spring of 2013 to focus on areas where culturally significant herbaceous plant species are most likely to be present within the Project Area.*	When will the results of the 2013 survey be incorporated into the previous plant surveys?	See response to comment #302 FMIT-47.			Comment resolved pending submittal of the Mature Plants Survey report.	Comment resolved. The revised Floristic Survey Report was submitted to DTSC and DOI on December 30, 2013. The revised report expanded on the previous plant survey report (which covers the 2011/2012 surveys), and included the Spring 2013 survey results of the freshwater evaluation areas in Arizona.	See the May 19, 2014 *Addendum to Mature Plant Survey Report for the PG&E Topock Compressor Station* included in Appendix A4 of the 90% BOD.
316	FMIT-49 Hualapai-35 Chemehuevi-35 Cocopah-35 CRIT-35	Append A7 Append-E of A7 (Avoidance and Restoration Plan for Significant Plant Species") P. A7-E-2	*Topsoil salvaged from short-term disturbance areas should be piled to no more than 4 feet high and stabilized to prevent loss during storage.*	It is not clear however how the 4-foot maximum depth was determined. Will surface soils stored at the bottom of a 4 foot stock pile be able to preserve the biological integrity of the soils for extended durations? It is requested that PG&E provide a technical memorandum outlining options for how the biological integrity will be ensured during short- and long-term soil storage.	The height of the stockpile was determined based on the ability of the stockpiled soil to maintain viable seeds and nutrients. The American Association of State Highway and Transportation Officials (AASHTO) developed The Compendium of Environmental Stewardship Practices in Construction and Maintenance <http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/ best practices/> which includes thousands of individual practices used by DOTs across the country. Through a peer review vetting process, a number of practices in the Compendium have been identified as Best Practices. In Chapter 4 Section 4.11.1 under Soil Management Practices, the maximum depth of soil stockpiles is recommended to be no more than 4 feet: "When stockpiling topsoil, mound soil no higher than 1.3 m (4 feet) high for less than 1 year. Cover to prevent soil erosion and contamination by weeds." (See attached PDF). However, a literature review of soil stock piling (Strohmeyer 1999) suggest that adverse effects may occur in soil stockpiles greater than one meter (3 feet) deep. Therefore the cited text will be revised to indicate the temporary topsoil stockpiles will not exceed a depth of 3 feet. This new specification for top soil			Comment resolved.	Comment resolved.	CIMP Appendix A (Mitigation and Monitoring Plan for Culturally Significant Plants), Section 2.3.1 2nd paragraph.

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					storage will be incorporated into the 90% BOD. Based on the insignificant amount of top-soil anticipated to be stored, PGE does not believe that a technical memorandum is warranted.					
Specific Comments – Appendix A8 (Supplemental Baseline Sound Level Measurement Technical Memorandum)										
317	FMIT-50 Hualapai-36 Chemehuevi-36 Cocopah-36 CRIT-36	Append A8		There needs to be a narrative that explains how these baseline data will be used in any decision-making process(es), and as a part of Mitigation Measures NOISE-1, NOISE-2 or NOISE-3.	The purpose of the supplemental sound data (collected in 2012 and 2013) was to augment the then existing noise data set (collected during the EIR development period) which is comprised of data collected over a single 15-minute period in December 2008 at the short-term measurement locations in the FEIR (shown in Exhibit 4.9-2 as ST-1, ST-2, and ST-3). As with other existing environmental conditions (e.g., water quality, site topography, vegetation communities, etc.), the purpose of the data is to document site conditions prior to remedy implementation. In compliance with mitigation measure NOISE-1 and NOISE-2, PG&E has designated disturbance coordinators who will manage any project-related complaints. In addition, PG&E will comply with mitigation measure CUL-1a-8h, protocols to reduce auditory impacts as part of the future CIMP. The above noise data is available for use, if needed and as appropriate. See also response to TRC's (Charlie Schlinger) memorandum dated December 10, 2013, included in **Attachment H**, at the end of this table.	The noise data collected for the EIR was used to determine the threshold sound energy for the project. No additional decisions will be made based on the long term or short term survey results.		Comment resolved. Tribal concerns regarding noise may be different than applied regulatory standards.	Comment resolved. PG&E will insert the Appendix A8 RTCs at the end of Appendix A8.	Appendix A8 RTCs at the end of Appendix A8.
318	FMIT-51 Hualapai-37 Chemehuevi-37 Cocopah-37 CRIT-37	Append A8		A tabular inventory and map of noise source locations (inclusive of sound power levels, with time dependencies noted) is needed in order to assess the noise impact(s) of this project. There should be an inventory and map for each of the construction and operational periods.	Comment noted. This information will be provided at 90% BOD once the infrastructure locations/ alignment are settled. See also response to TRC's (Charlie Schlinger) memorandum dated December 10, 2013, included in **Attachment H**, at the end of this table.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Appendix D, Table D1-13.
319	FMIT-52 Hualapai-38 Chemehuevi-38 Cocopah-38 CRIT-38	Append A8		It is not clear whether and how the selection and specification of noise-generating equipment, such as transformers, above-ground pumps, and motors, etc., will utilize noise-restrictive criteria.	The majority of pumps and motors will be located either underground, inside a well, or inside an enclosure (e.g., building). Power supply equipment/backup generator also will be located inside enclosures or buildings. Placing pumps, motors,			Comment resolved pending review of the 90% design.	Comment resolved.	Not applicable

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					and power supply/ backup generators in these locations effectively minimizes the sound emissions. The remaining non-emergency above ground equipment is limited to transformers which are similar in size to the one already operating at IM-3, and communication/control panels. Selection of this equipment will be reviewed by the Noise Engineer for conformance with the noise design criteria (see Section C.11). See also response to TRC's (Charlie Schlinger) memorandum dated December 10, 2013, included in **Attachment H**, at the end of this table.					
320	FMIT-53 Hualapai-39 Chemehuevi-39 Cocopah-39 CRIT-39	Append A8		The important effect(s) of meteorological conditions on the long-range propagation of sound should be addressed.	Meteorological effects are most pronounced for elevated sources or very loud sources, particularly those with strong low frequency content (such as a train). The operational sources of noise associated with this project are primarily located within buildings or underground, therefore their sound emissions are minimized and are not elevated. This project does not utilize equipment which is known to emit high levels of low frequency noise (such as train engines or unsilenced simple-cycle combustion exhaust stacks). See also response to TRC's (Charlie Schlinger) memorandum dated December 10, 2013, included in **Attachment H**, at the end of this table. Below is PG&E's response to the suggested language to close this comment: 1. The methodology for noise measurement in Topock Project Sound Level Measurements Protocol complies San Bernardino County Code 83.01.080(a) – Noise Measurement, and the EIR. The County requirements include the use of a sound level meter that meets ANSI standard, Type 1 or 2, and use the "A" weighted sound pressure level with unit of measurement as dB(A). The dB(A) is the sound pressure level as measured on a meter using the A-weighting filter	DTSC recognizes that meteorological conditions generally have the potential to result in increased, or decreased, noise exposure at known sensitive receptors. CEQA requires lead agencies to consider whether a project would have a substantial permanent increase in ambient noise levels above levels existing without the project, or a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Here, construction noise for the project was appropriately identified as a potentially significant impact and mitigation measures were imposed in "Mitigation Measure NOISE-2: Project Generated Construction-Related Noise Levels". This issue will be considered further if needed based on the final design.		. See the following language in the Hualapai Tribe's letter (3/10/14) – Use the following language for closure of this comment: 1. Revise the noise measurement protocol in consultation with the Tribes. Specifically, the protocol needs to include the collection and archiving of noise measurements that include spectral content (noise level as a function of frequency, which consists of unfiltered and un-weighted, or un-averaged, raw data, aka band spectra), and noise recordings accompanied by a spoken or written narrative addressing what noise and sounds are being heard. 2. Following the above revised protocol, collect additional noise data during the summer and early winter of 2014. 3. Adopt the protocol for use on the project, going forward.	Written comments on the responses to this comment were received from the TRC (Charlie Schlinger) on November 15, 2013. PG&E provided a response to the written comment on December 10, 2013 (see memo included in **Attachment H**, at the end of this table). The TRC (Charlie Schlinger) presented draft proposed language to this comment at the February 11, 2014 TWG meeting. On March 10, 2014, the Hualapai Tribe provided a letter with language to close out the unresolved noise and vibration-related comments (see **Attachment H**, at the end of this table).	CIMP Noise Protocol CUL-1a-8h.

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					network. Noise standards are expressed as Leq which is the equivalent energy level of a time varying signal over a given period of time, typically, 1, 8, or 24 hrs. Further, the EIR identified the applicable criteria as A-weighted. There is no technical or regulatory basis to revise the measurement protocol or to further clarify the existing sources. For the above reasons, PG&E believes that it is not necessary to collect additional measurements or noise recordings to be consistent with the EIR. However, PGE recognizes the importance of the area to the Tribes, and should a concern about the actual noise generated by remedy operations arise, PG&E will work with the Tribes, agencies, and stakeholders to thoroughly investigate and resolve the issue appropriately . 2 & 3. See response to #1 above.					
321	FMIT-54 Hualapai-40 Chemehuevi-40 Cocopah-40 CRIT-40	Append A8 p. 1 and Figure 1	*The sound measurement locations were selected near the short term measurement locations in the Final Environmental Impact Report (FEIR) (DTSC,2011).*(shown in Exhibit 4.9-2 as ST-1, ST-2, and ST-3) (see Figure 1)	The three sites, ST-1, ST-2 & ST-3, have quite different levels of background sound levels and time—distributions, but this is not discussed. The report as it stands provides practically no quantitative evidence about the nearby noise sources and their (expected/measured) spatial contribution to the background noise. Such information is crucial to properly analyze and understand the highly variable background noise which was measured across the three sites. Further, it is unclear as to why these sites were chosen. *"PGE asked for clarification of this comment prior to response. The following clarification of comment was obtained from TRC on October 17, 2013. Response addresses the clarified comment.* *It is unclear what the data entries included in Appendix A8 Tables (1 & 2) represent? It is assumed that these data represent averages of other numbers presumably numbers in the Appendices (C-H) of Appendix A8. Please confirm if this assumption is*	American National Standards Institute (ANSI) S1.4 Type 1 (precision) sound level meters were used to monitor ambient sound levels. The sound level meters were programmed to report the average (L_{eq}) and statistical sound level metrics (Leq, L50, and L90) at hourly intervals. The sound level meters continuously monitor the sound levels during each hourly interval and automatically calculate and report the average and statistical levels at the conclusion of the hourly interval. This process repeats continuously until the meters are manually turned off or the batteries are depleted and	A specific rationale for the selection of individual sites for noise measurements was not provided in the Groundwater Final EIR. Based on the locations of the monitoring locations, the following can be inferred: ST 1 was chosen for its proximity to Maze Loci A; ST 2 was chosen for its proximity to Maze Loci C; ST 3 was chosen for its proximity to residences and traffic intersection at Park Moabi; LT A was chosen to provide ambient noise data from I-40; and LT B was chosen to provide ambient noise data from the BNSF rail line. It can also be inferred from the text in the Final EIR that the five locations were identified in recognition of the existing noise environment associated with the site (i.e., the diversity of background sound levels that exist on the site) and the existing noise-sensitive land uses. Further, because		The Tribe was not involved in the selection of the sites in the FEIR and the 2012-2013 study. The Tribe also note that there is no noise monitoring plan. See the following language in the Hualapai Tribe's letter (3/10/14) – Use the following language for closure of this comment: 1. Revise the noise measurement protocol in consultation with the Tribes. Specifically, the protocol needs to include the collection and archiving of noise measurements that include spectral content (noise level as a function of frequency, which consists of unfiltered and un-weighted, or un-averaged, raw data, aka band spectra), and noise recordings accompanied by a spoken or written narrative addressing what noise and sounds are being heard. 2. Following the above	Written comments on the responses to this comment were received from the TRC (Charlie Schlinger) on November 15, 2013. PG&E provided a response to the written comment on December 10, 2013 (see memo included in **Attachment H**, at the end of this table). The TRC (Charlie Schlinger) presented draft proposed language to this comment at the February 11, 2014 TWG meeting. On March 10, 2014, the Hualapai Tribe provided a letter with language to close out the unresolved noise and vibration-related comments (see **Attachment H**, at the end of this table).	Not applicable

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				correct. In addition it is not clear what the numbers in Appendices C-H represent? Presumably, they too are "averages" of other numbers - these latter numbers probably being what was actually measured. Please provide additional detail that allows the reader to understand what was actually measured and for what duration(s). That is, what are the basic measurements for this baseline sound characterization, and what "averaging" methods were used to develop the tabular summary information? *Site selection is a critical matter when it comes to developing a baseline. In the case of noise on this project, 3 sites were selected, with very little basis/justification provided in the FEIR. (The initial response to comments for this comment goes a long way in providing some explanation, but it is not complete, as*	the meter automatically turns off. Appendices C through H present the data reported by the sound level meters in tabular and graphical format. The data in Table 1 is a summary of the data presented in Appendices C through H. Table 1 presents the maximum and minimum hourly Leq sound pressure level and corresponding wind speed for each monitoring location during both the daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) periods for both the summer and winter monitoring events. For example, the data presented in Appendix C (ST-1, August 2012) was reviewed to identify the maximum and minimum L_{eq} during the daytime and nighttime periods. These maximum and minimum levels were summarized for in Table 1 along with the wind speed that occurred during those maximum and minimum periods for ST-1 during August 2012. Table 2 presents the same sound pressure level data that is in Table 1 alongside the data collected from the 2008 EIR (the wind speed which was reported in Table 1 was omitted from Table 2 to enhance readability of Table 2). Table 2 shows that the short-term data collected for the 2008 EIR is within the range of the longer-term data collected over both a summer and winter period. Had the 2008 EIR sound level data fallen substantially outside the range of that recorded during this longer term monitoring event, its reproducibility could have been questioned. This did not occur. That is, there was nothing anomalous or spurious occurring during the time the sound level data reported in the 2008 EIR was collected. These sites were chosen by the EIR preparer for noise measurements because mesas that generally shield noise sensitive receptors from full exposure of operations that were occurring when the EIR was prepared, exist between the compressor station and other portions of the project areas (see FEIR, page 4.9-5). Additional data	intervening topography exists between the compressor station and other portions of the project areas in the form of mesas that generally shield noise-sensitive receptors from full exposure of current on-site operations, multiple representative sites for ambient noise measurements were necessary. To accurately describe potential noise related impacts, the Final EIR used the ambient noise survey data from the individual locations to determine impacts to nearest sensitive receptors from the proposed project (i.e., the data collected for the three sites was not averaged). The normalization of the data described above, was conducted for individual sites only.		revised protocol, collect additional noise data during the summer and early winter of 2014. 3. Adopt the protocol for use on the project, going forward.		

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				ST-1 and ST-2 are indeed located on "mesa" tops (upland areas) and one, ST-3, is located down off of the "mesa", at a street intersection.) Please provide additional detail regarding what is it about these sites that is representative and meaningful when it comes to baseline noise measurements? Why are these locations appropriate for developing the baseline sound characterization? *The reporting in Appendix A8 is too clinical and terse; there are no more than a half-dozen sentences given to the discussion of results, mainly with an eye toward wind effects on noise measurements. While there are essential footnotes related to measured wind speed, which is highly relevant to noise measurements, there is no interpretation and discussion of the numerical values in Tables 1-2, or in the Tables in Appendices C-H in terms of individual site location and proximity to known noise sources, time of day, actual noise from these sources, season, atmospheric conditions, topographic conditions, or any other factor known to influence the measurements.* *There needs to be clear communication, in the design documents, of how these most recent noise data, together with the FEIR noise data collected in 2008, will be used as part of the project design.*	was collected in proximity to these sites in 2012 – 2013. Agencies, Tribes, and Stakeholders were informed of this selection as documented in the *Sound Level Measurements Protocol Technical Memorandum* (Appendix B to the 60% BOD Appendix A8). See also response to comment #322 FMIT-55/Hualapai-41. The *Sound Level Measurements Technical Memorandum* in Appendix A8 is intended to report the supplemental data collected during the 2012-2013 event. Since the existing site conditions (e.g., noise environment, topographic condition) are well documented in the FEIR, that body of information is intentionally not repeated in this technical memorandum. If helpful, additional references to the FEIR can be added to this technical memorandum. See responses to comment #317 FMIT-50/Hualapai-36 and #319 FMIT-52/ Hualapai-38, as well as TRC's (Charlie Schlinger) memorandum dated December 10, 2013, included in **Attachment H**, at the end of this table. For PG&E's response to suggested language to close this comment, see RTC #320.					
322	FMIT-55 Hualapai-41 Chemehuevi-41 Cocopah-41 CRIT-41	Append A8 p.1 and Photo 1 & 2		The 60% BOD Report Appendix A-8 noise measurement locations are reported to be "near" and "in proximity to" the certified EIR noise measurement locations. The meanings of these terms are ambiguous and need clarification. Why were the certified EIR noise measurement locations not used?	Precise GPS locations were not available for the locations used in the certified EIR. The 2012 – 2013 noise measurement locations were selected based on their suitability for a longer term noise measurement. All of these locations are within approximately 100 feet of the EIR noise measurement locations and are well within the same acoustical environment.			The Tribes were not involved in the selection of the sites in the FEIR and the 2012-2013 study. The Tribes also note that there is no noise monitoring plan.	This comment and response were discussed at the October 16-17, 2013 TWG meeting. Comment resolved.	Not applicable
Specific Comments – Appendix B (Development of Groundwater Flow, Geochemical, and Solute Transport Models) and Sections 3.1 and 3.2										
323	DOI-144	Appendix B	General Comment	It is recommended that an executive summary be prepared that discusses and summarizes the main points of the modeling. Findings and recommendations should be	An executive summary will be prepared to summarize the main points in the modeling and will serve as an introduction to Appendix B in the 90% Design Submittal.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Apdx B, Executive Summary

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				highlighted so the reader is aware of what will be implemented and how the findings will be incorporated into the remedial program design.						
324	DOI-145	Section 2.4, Page 7	"Specifically, this involves the simulation of native microorganisms through the delivery of a degradable source of organic carbon, . . . "	What types/species of microorganisms are present at the Topock site?	The pilot tests conducted at the Topock site demonstrated that the bacteria capable of generating the reducing conditions required for chromium reduction are present. The data generated in the pilot studies indicated that aerobic bacteria, denitrifiers, manganese reducers, iron reducers, sulfate reducers, and methanogens are present and were stimulated by the addition of lactate and ethanol at the site. Further analysis of which species of bacteria are present was not conducted and is not necessary to design or implement the remedy. A reference to where the pilot tests are discussed in Section 3 will be added to this section.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Apdx B Section 2.4
325	DOI-146	Section 2.4, Page 8	"Note that the reduction of chromate is thermodynamically more favorable than the reduction of Mn(III/IV), Fe(III), and $SO4^{2-}$[S(VI)]; therefore, it is not theoretically necessary to achieve manganese-, iron-, or sulfate-reducing conditions in order to reduce Cr(VI)."	It has been reported that Cr(III) will oxidize to Cr(VI) in the presence of Mn(IV) oxides. Could this possibly occur at the Topock site? Please discuss.	The issue of re-oxidation of Cr(III) precipitated during in-situ remediation to Cr(VI) by manganese oxides was evaluated extensively as part of the Corrective Measures Study/Feasibility Study in conjunction with the Technical Working Group and members of the United States Geological Survey. The oxidation of naturally occurring Cr(III) to Cr(VI) is responsible for the natural background concentration of Cr(VI) in groundwater. This oxidation process is anticipated to convert Cr(III) precipitated by in-situ remediation. However, the rate and extent of oxidation is anticipated to be limited to background levels by two key factors: the limited solubility of Cr(III) and the lack of reactivity of the manganese oxides in an IRZ area. Thus, the conclusion of the analysis of the CMS/FS was that "The degree of reversibility of the Cr(VI) reduction reaction is expected to ultimately result in Cr(VI) concentrations at levels similar to ambient Cr(VI)" (Table 5.5 of the CMS/FS). A detailed analysis of this topic was presented in Appendix G, Section 7 of the CMS/FS. Text will be included in the 90% BOD		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Apdx B Section 2.4

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					to reflect this response.					
326	DOI-147	Section 2.4, Page 8	"The goal within the IRZ is to make the reducing environment strong enough that the desired reduction reactions are achieved, without making it so strong as to drive unnecessary or undesirable reduction reactions that may generate byproducts (discussed below)."	What monitoring program will be established to ensure this occurs? Please reference the appropriate sections in the Sampling and Analysis Plan for details on monitoring.	The following text will be added to this paragraph in the 90% Design Submittal: "An extensive monitoring program will be implemented to ensure that this is accomplished; namely, that Cr(VI) reduction is complete, while byproduct generation is minimal and controlled (see NTH IRZ data quality objectives in Appendix L, Volume 2, Section 2.2.1 and monitoring program details in Appendix L, Volume 2, Section 4)."		Comment resolved.		Comment resolved.	90% BOD Apdx B Section 2.4
327	DOI-148	Section 3.2, Page 12	"These results demonstrate that byproduct generation is directly related to the strength of the reducing environment created. The reducing environment can be adjusted to minimize byproduct liberation without negatively impacting Cr(VI) reduction by properly controlling organic carbon dosing and distribution."	How will the reducing environment and byproduct liberation be monitored and adjusted? Please reference the appropriate sections in the Sampling and Analysis Plan for details on byproducts.	The following text will be added to this bullet in the 90% Design Submittal: "These relationships between TOC dosing and byproduct generation will be verified during remedy implementation. Specifically, an extensive monitoring program will be implemented to assess Cr(VI) treatment, TOC consumption, and byproduct generation as the remedy proceeds (see NTH IRZ data quality objectives in Appendix L, Volume 2, Section 2.2.1 for the NTH IRZ, and monitoring program details in Section 4, Appendix L, Volume 2)."		Comment resolved.		Comment resolved.	90% BOD Apdx B Section 3.2
328	DOI-149	Section 3.4.1, Page 13	"These results also highlight the importance of a sustained TOC concentration to achieve	With river deposits, it is anticipated that varves of differing grain sizes may be present. The occurrence of varves may cause fingering of TOC injections. How does PG&E plan on addressing this potential issue?	Injected fluids will migrate within the unconsolidated aquifer materials according to natural preferential pathways defined by permeability heterogeneity. These pathways will be the same for Cr(VI) migration. The river deposits (fluvial deposits) have		Comment resolved.		Comment resolved.	90% BOD Apdx B Section 3.4.1

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			Cr(VI) treatment, . . . "		a lesser degree of such heterogeneity than the alluvial deposits based on descriptions of cuttings from boreholes drilled for monitoring wells. In addition, variability in transport and reagent distribution will be assessed in the monitoring program through monitoring of TOC dose-response (see Appendix L, Volume 2: NTH IRZ data quality objectives, Section 2.2.1 and monitoring program details in Section 4). Specifically, if aquifer heterogeneity results in incomplete Cr(VI) treatment with TOC amendments, operational adjustments will be made to improve performance.					
329	DOI-150	Section 3.4.1, Page 14	"Cases where high ORP was observed in the presence of TOC, particularly in the upland ISPT (e.g., PT-7S), were likely due to the mixing of treated and untreated water, as well as the time required for initial establishment of a reducing environment with an active microbial community."	What is the anticipated time period for establishment of an active microbial community?	Upon initial introduction of organic carbon into a new area, the stimulation of microbial activity of the indigenous population of microorganisms present will be almost immediate. The growth of that initial population into the mature microbial community takes several weeks.		Comment resolved.		Comment resolved.	Not applicable
330	FMIT-56 Hualapai-42 Chemehuevi-42 Cocopah-42 CRIT-42	Append B Section 3.4.2 p. 15	TOC Degradation Half- Life	TOC half-life will be affected by the presence of dissolved nitrate. When the nitrate plume is hydraulically pushed through the IRZ line, the system could perform differently than predicted by the TOC degradation half-life of 20 days. When will the nitrate plume arrive at the IRZ line? Can the model provide such a forecast?	See response to #62a FMIT-19.			See response to #62a FMIT-19.	Comment resolved (see also #62a FMIT-19.)	O&M Manual Volume 2 Section 4.2.1 O&M Manual Volume 2 Table 2.1-2
331	DOI-151	Section 3.4.2, Page 15	"This is a reasonable assumption based on data developed	The discussion focuses on the expected half-life of TOC. The information in this paragraph maintains that research conducted at	Similar to the Topock site pilot tests, injection of lactate and ethanol stimulated the activity of aerobic bacteria, denitrifiers, manganese reducers, iron reducers and sulfate		Comment resolved pending review of the 90% design.		Comment resolved.	90% BOD Apdx B Section 3.4.2

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			from the Hinkley site, . . . "	the Hinkley site is applicable to the Topock site. Are the microorganisms found at the Hinkley site similar to or the same as the microorganisms present at the Topock site?	reducers at Hinkley. At Hinkley, the degradation rates of lactate and ethanol were similar, supporting the assumption made in the modeling at Topock that the degradation rates of lactate and ethanol are similar. Microbial activity at both sites were able to develop sufficient reducing conditions to successfully reduce Cr(VI). Additional detail on the use of lactate and ethanol at the Hinkley site will be added to the text.					
332	DOI-152	Section 3.4.4, Page 16	" . . . indicate a mobile porosity of 12%."	How will precipitation of chemicals in response to geochemical reactions impact mobile and immobile porosity?	Precipitation of minerals will not have a noticeable impact on porosity or permeability within the aquifer. This issue was investigated in the Corrective Measures Study/Feasibility Study Report for Chromium in Groundwater (December 2009), with permeability reduction calculation results provided in Appendix G, Section 4.4 of that report. Specifically: "The amount of additional total Cr that will be added by the in-situ treatment is very small compared to the naturally-occurring concentration of total Cr in the soil... [which would] result in a porosity reduction of 1.3E-5 (absolute), a level that will have a negligible effect on aquifer permeability for any of the mobile porosities noted..."		Comment resolved.		Comment resolved.	Not applicable
333	DOI-153	Section 4, Page 18, 1st paragraph		During use of the PEST program, how was each parameter designated (e.g., adjustable, fixed, or linked)?	The horizontal hydraulic conductivity, the ratio between horizontal and vertical hydraulic conductivity, and the river bed conductance were adjusted within reasonable ranges, and final values were accepted based on both PEST output and professional judgment. The remainder of the model parameters were fixed to values from site characterization or determined during manual calibration.		Comment resolved.		Comment resolved.	Not applicable
334	DOI-154	Section 4, Page 18, 1st paragraph		The PEST program allows optimum parameter values to be constrained between individually-specified upper and lower bounds. How were specific upper and lower bounds chosen, and on what data were they based?	The bounds were chosen based on professional judgment, given previous non-PEST analyses of aquifer test data, observed drilling cores and well logs, and general hydrogeologic knowledge of parameter ranges. These bounds started as broad values and were		Comment resolved.		Comment resolved.	Not applicable

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					constrained as deemed necessary in subsequent PEST runs.					
335	DOI-155	Section 4, Page 18, 1st paragraph	"Groundwater budget was developed from regional river gradient and estimates of precipitation recharge, subsurface inflow beneath major and minor washes, evapotranspiration, and subsurface outflow."	What data was used to calculate evapotranspiration? Was the data site-specific?	Presented in 2005 Groundwater Flow Model Update Report (Section 2.5.2). The evapotranspiration (ET) rate was not designed to correspond to published plant ET rates, but as a value averaged over nodal areas which consist of both bare soil along with plant growth. The value of 9.59e-04 ft/d was assigned to areas where plant growth is obvious from field conditions and aerial photographs. This value assumes a roughly 10-20% ground cover for each nodal area and average ET values published for several species typical to this region including Fourwing Saltbrush, Salt Cedar, Arrowweed, and Quailbrush (Mc Donald, Charles C., and Gilbert H. Hughes. 1968. *Studies of Consumptive Use of Water by Phreatophytes and Hydophytes Near Yuma, Arizona*. Water Resources on Lower Colorado River Salton Sea Area. USGS Paper 486-F, Washington, DC.; Gay, Lloyd W. 1986. Water Use by Saltcedar in an Arid Environment. p.855-862. In Karamouz, Mohammad., George R. Baumli, and William J, Brick. Water Forum '86: World Water Issues in Evolution. Volume 1. American Society of Civil Engineers, New York, NY.). An extinction depth of 10 feet was assigned, corresponding with the assumed average root depth. In active ET areas of the model domain (i.e., the southern floodplain, Bat Cave Wash mouth, Topock Marsh area) the plants are predominantly small and the water table is within several feet of land surface, so the 10-foot extinction depth is considered appropriate. In this model package, the maximum ET rate is applied only when the water table coincides with the ground surface. The rate decreases linearly to zero at the extinction depth. Therefore, all areas of the model in which the depth to water is greater than 10 feet have zero ET applied.		Comment resolved.		Comment resolved.	Not applicable
336	FMIT-57	Append B | Figure 5.3-1	Mn Oxide Reductive	Please present these rate constant calibrations and values. How do these	Additional detail on the equations, assumptions, and calibrated rate			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Apdx B Section 5.3.1

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	Hualapai-43 Chemehuevi-43 Cocopah-43 CRIT-43	5.3.1 p. 24	Dissolution, Figure 5.3-1, calibration of the rate constant for manganese and arsenic reduction.	constants compare with literature sources?	constant for manganese oxide dissolution will be included in Appendix B in the 90% design. Specifically, the half-reactions included in the PHREEQC database that link manganese oxide reduction to organic carbon (ethanol) oxidation are as follows: MnO_2: $H_2O + 4 H^+ + 2 e^- = Mn^{+2} + 3 H_2O$ $2 CO_3^{-2} + 16 H^+ + 12 e^- = C_2H_6O + 5 H_2O$ This yields: $6(MnO_2{:}H_2O) + 10 H^+ + C_2H_6O = 6 Mn^{+2} + 13 H_2O + 2 HCO_3^-$ Far from equilibrium, the kinetic rate will be independent of the concentrations of the products (right side of the equation), and assuming that the manganese oxide concentration and pH does not change appreciably within the IRZ, the kinetic rate becomes first order with respect to organic matter concentration: $d[MnO_2]/dt = -k*C$ where k is the rate constant and C is the organic carbon concentration. The rate constant value after calibration was determined to be 2.48e-4 inverse days. Importantly, this rate constant is highly site-specific, as the manganese oxidation rate will vary according to the properties of manganese phases within the aquifer (including the exposed surface area, mineralogy, purity, and crystallinity of manganese oxides and oxyhydroxides at the site) as well as the organic carbon microbial oxidation rate, as based on site-specific observations from pilot testing. Accordingly, literature values of manganese oxidation rates will not be directly comparable; regardless, a discussion of literature studies of microbial manganese oxidation will be included in the 90% design.					
337	FMIT-58 Hualapai-44 Chemehuevi-44	Append B 5.3.1 p. 24	*The solute transport model, therefore, links*	Would it be reasonable/helpful during the first cycle of TOC injections in the IRZ to monitor TOC and Mn at short time intervals at one or two	During startup, monthly monitoring at IRZ dose response wells is specified in the Sampling and Monitoring Program (Appendix L,			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Apdx B Section 5.3.1 O&M Manual Volume 2 Section 4.2.1

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	Cocopah-44 CRIT-44		*the generation of manganese directly to the concentration of TOC through a proportionality constant…*	selected points to confirm this relationship?	Volume 2, Section 4). The monthly monitoring frequency was specified, given the timescales required for transport of reagents from injection wells to dose response wells on the order of 1-2 months and establishment of a microbial population within the IRZ are on the order of weeks. As initial monthly samples are collected, the changes will be assessed and more frequent sampling will be conducted if necessary. This language will be added to Appendix L, Volume 2 for this portion of the sampling program.					
338	DOI-156	Section 6.2.1, Page 33	"The simulated mobile porosity of the aquifer is 12% of the total volume, with immobile porosity to be 28% of the total volume."	Was a sensitivity analysis conducted to deduce the effect of major model parameters on contaminant transport and, if so, how sensitive was the model to changes in the mobile porosity and immobile porosity values?	Sensitivity analyses were conducted during the calibration of the regional groundwater flow model (CH2M HILL 2005) and numerous sensitivity analyses were conducted and presented in the 60% BOD Appendix B (Section 10). Mobile and immobile porosity values were not addressed in the sensitivity analyses as these porosity values were determined during tracer injection tests conducted at the Site. With no changes in hydraulic conductivity or hydraulic gradient, the reduction in mobile porosity and an increase in immobile porosity would result in faster transport velocities, and slower velocities would occur with an inverse adjustment. Flexibility in components of the remedial design (well flow rates, provisional well locations, etc.) was integrated into the design to account for any variability encountered in the field.		Comment resolved.		Comment resolved.	Not applicable
339	MWD-11	Appendix B, 6.2.1, 3rd paragraph	"...with the immobile porosity to be 28% of the total volume."	The immobile porosity should be 23% given the mobile porosity is 12% and the total porosity is 35%.	Agreed, this was a typographical error in the text and will be corrected. All of the solute transport model runs utilized an immobile porosity of 23% and a mobile porosity of 12%.				Comment resolved.	90% BOD Apdx B Section 6.2.1
340	MWD-12	Appendix B, Section 6	PHREEQC modeling	Providing the PHREEQC model inputs and outputs as an attachment would be informative for the various geochemical assessments and would provide further supporting data for the reviewers.	Select example model PHREEQC input files will be provided in Appendix B of the 90% Design Submittal.				Comment resolved.	90% BOD Apdx B Sections 5.2, 5.3.1, 5.3.2, and 5.4.1
341	FMIT-59 Hualapai-45 Chemehuevi-	Append B 6.2.7 p. 36	*Dissolved iron … will also precipitate*	Carbon concentrations will remove dissolved oxygen, and the anoxic water (possibly a low-DO plume) will	Oxygen will be introduced through the natural flux of dissolved oxygen in groundwater flowing from areas			The Tribes request a contingency plan to address high manganese and low pH	Comment resolved.	90% BOD Section 3.4.2 90% BOD Apdx B Section 6.2.7

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	45 Cocopah-45 CRIT-45		*through reaction with dissolved oxygen in the aquifer. Manganese concentrations will attenuate via… reoxidation.*	migrate downgradient from the IRZ line towards the IRZ or riverbank extraction wells. How will dissolved oxygen be reintroduced into the aquifer for these reactions to take place? What will be the resulting pHs of the aquifer water? What will happen to all of the dissolved gases (CO2, H2(g), H2S, N2) that will be produced as part of the remediation?	outside of the IRZ and from the river. In more oxic portions of the aquifer, Fe(II) uptake will occur both through reaction with dissolved oxygen and by adsorption to/oxidation by Fe(III) minerals, forming mixed Fe(II)/ (III)-oxides. Dissolved oxygen and iron minerals in the deeper aquifer will mix and come into contact with groundwater coming in from upgradient. As iron minerals accumulate downgradient of the IRZ, this will continue to provide additional sorption capacity for manganese and arsenic. This process of attenuation of iron by sorption, rather than re-oxidation, is similar to the attenuation mechanism that is anticipated and that was modeled for manganese. Changes in pH and production of dissolved gases are not anticipated to be a concern based on the in-situ pilot test (ISPT) results as well as results observed at Hinkley and other sites. During pilot testing, no significant changes in pH were observed in monitoring wells, indicating that any pH changes caused by carbon consumption and subsequent redox/precipitation/dissolution reactions were adequately buffered by the aquifer solids. Dissolved gas concentrations generated within the IRZ are anticipated to be sufficiently low as to minimize formation of a gas phase within the aquifer. Given the relatively low carbon concentration used in pilot testing and specified in the design, any CO_2 generated will be at a low enough concentration that it will remain dissolved and be flushed through the IRZ over time. Further, pH buffering to circumneutral values will ensure that most of the inorganic carbon generated will be present as bicarbonate rather than dissolved CO_2. Formation of $H_2(g)$ and H_2S will be limited by controlling TOC concentrations to limit byproduct generation. Formation of these gases (as well as N_2 formation) was not an			in groundwater. Comment resolved pending review of the 90% design.		

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				Can these affect the reducing rind enveloping the Colorado River?	issue during the pilot testing conducted in the floodplain. Gas generation was higher during the upland ISPT in locations where organic carbon was distributed at concentrations in the 5,000 to 10,000 mg/L TOC range. The upland ISPT results indicate that lower concentrations of organic carbon, which have been proven effective, should be used to prevent excess gas generation; and lower concentrations have been specified in the design. The changes associated with the in-situ system are not expected to affect the reducing rind enveloping the river; if anything they will reinforce the effects.					
342	DTSC-117	Appendix B 6.2.8 Naturally Occurring Manganese, Page 37	To account for the naturally occurring manganese in the floodplain, the average observed manganese concentrations in the floodplain were delineated based on well data correlated to model layer elevations. Figures 6.2-5 and 6.2-6 display the delineated naturally occurring average floodplain manganese in model layers 1 through 4.	Please prepare a table of the average observed manganese concentrations, or reference the location of the dataset that were used in preparing each figure/model development. DTSC remains concerned with the depiction of the prevalence of manganese in the modeling figures.	The average observed manganese concentrations used to delineate the naturally occurring manganese are presented in Figure 2.3-5 of the 60% BOD, and the complete data set is provided in Appendix A1 of the 60% BOD.	Okay.			Comment resolved.	Not applicable
343	DTSC-118	Appendix A 6.4/page 37	Basis for Recirculation Design	Please provide an additional run of the model evaluating the potential of commencing the remedy by injecting into the Riverbank and East Ravine injection wells to confine the plume hydraulically away from the Colorado River before employing the proposed recirculation.	Based on the current remedy design the River Bank and East Ravine wells are specifically designed as extraction wells not injection wells. The scenario presented in the comment is not considered viable.	Comment resolved.			Comment resolved.	Not applicable

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344	FMIT-60 Hualapai-46 Chemehuevi-46 Cocopah-46 CRIT-46	Append B 6.4.1p. 39	*"This system component is designed to be a recirculating system where all the water extracted along the NTH IRZ will be amended with carbon and injected into the NTH IRZ, resulting in a net flow of 0 gpm along the NTH IRZ line."*	If the injection capacity along the NTH IRZ is not sufficient to handle the proposed volume, can it be assumed that the river bank extraction volume would be reduced to match the actual injection capacity?	Water extracted from the NTH IRZ Extraction Wells will be used for injection along the NTH IRZ line. Water from the River Bank Extraction Wells will be injected into the IRL wells in the Uplands. If the NTH IRZ Injection Wells cannot handle the volume generated by the NTH IRZ Extraction Wells, the extraction rate will be reduced and the need for additional NTH IRZ Injection Wells will be considered.			Comment resolved.	Comment resolved.	Not applicable
345a	FMIT-61	Append B 6.4.1 Figure 6.4-2	Figure 6.4-2	In this figure, the IRZ-18 is shown as a planned well, with an un-numbered pink provisional dot adjacent to it. Was IRZ-18 changed from provisional to planned based on results of model runs that suggested potential fingering of Cr(VI) between wells IRZ-17 & -19? IRZ-18 was not on the list of wells in the BOD section 3.2.1 but it seems it was included in some figures showing the IRZ system layout.	This error will be corrected in Figures 3.1-1 (60% BOD) and 6.4-2 (Appendix B of the 60% BOD). IRZ-18 is a provisional well and should correlate to the adjacent un-numbered pink provisional dot. The purple proposed IRZ-18 dot and label will be removed. All of the solute transport model runs correctly have IRZ-18 as a provisional well, and this error is limited to the posting figure.			Comment resolved.	Comment resolved.	90% BOD Apdx B Figure 6.4-2
345b	Hualapai-47 Chemehuevi-47 Cocopah-47 CRIT-47	Append B 6.4.1 Figure 6.4-2	Figure 6.4-2	In this figure, the IRZ-18 is shown as a planned well, with an un-numbered pink provisional dot adjacent to it. Was IRZ-18 changed from provisional to planned based on results of model runs that suggested potential fingering of CrVI between wells IRZ-17 & -19? IRZ-18 was not on the list of wells in the BOD section 3.2.1 but it seems it was included in some figures showing the NTH IRZ system layout.	See response to comment #345a FMIT-61.			Comment resolved.	Comment resolved.	90% BOD Apdx B Figure 6.4-2
346	FMIT-62 Hualapai-48 Chemehuevi-48 Cocopah-48 CRIT-48	Append B – 6.4.7 p. 43	*It is assumed that HNWR-1…will be treated for naturally occurring arsenic…therefore the simulated Freshwater Injection Wells did not contain arsenic.*	If the State Board allows injection of untreated water from HNWR-1 (or other freshwater source), will these runs be repeated using the initial, natural arsenic concentrations?	Yes, if the injection of untreated HNWR-1 water is allowed, these runs can be updated to reflect the natural arsenic concentrations associated with the freshwater injection.			Comment resolved pending review of the 90% design and pending State Board decision.	Comment resolved.	90% BOD Apdx B Section 6.4.7
347	FMIT-63	Append B 6.5	Figures 6.5-5	Current monitoring of river bank	Yes. Although there are seasonal			Comment resolved.	Comment resolved.	90% BOD Apdx B Section 7.4

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	Hualapai-49 Chemehuevi-49 Cocopah-49 CRIT-49	Figures 6.5-5 thru 6.5-8	thru 6.5-8	wells indicates that those wells closest to the river are influenced by the strong seasonal river level changes. These figures appear to suggest that these strong seasonal variations will have a nominal effect on the overall GW gradients/river bank extraction during the remedial operation. Is that accurate?	changes in river stage that result in local variations in groundwater flow, the overall performance of the long term remedy operation will reflect that of average conditions. As discussed in Appendix B Section 7.4, river stage fluctuations were considered using model simulation as well as a comparative analysis of transient and steady state results. The overall conclusion of these two analyses was that the steady state model is appropriate to use for the long term simulation of the remedial design. This will be clarified in Section 7.4 of Appendix B.					
348	DOI-157	Section 7.1, Page 45	"The solute transport model was run for a period of 50 years utilizing the transport parameters and flow conditions described in Section 6 for the simulated Cr(VI)."	Given the complexity of site stratigraphy and the required amendment injection balancing needed to minimize byproduct generation of Mn and As, it may take over 18 months to establish a balance in O&M operations. As such, please provide model results for 3 and 5 years so comparisons with model runs to actual observations can be made at later dates.	Simulated transport model results for 3 and 5 years will be provided.		Comment resolved.		Comment resolved.	90% BOD Apdx B Section 7.1
349	DTSC-119	Appendix A Figure 7.1-x	Simulated Maximum IRZ Generated Hexavalent Chromium Transport Results	The modeling results shows residual concentrations remain at year 30 whereby the remedy needs to be extended. Please provide additional years modeling to predict the actual anticipated remedy completion. In addition, the first 20 years of extraction does not demonstrate adequate contaminant plume control hydraulically as evidenced by the migration and release past the zone of capture of the Riverbank injection wells beyond the banks of the Colorado River.	Additional simulation times beyond year 30 can be generated. Although the simulated results in Model Layer 4 indicate a portion of the low concentration plume migrates under the river in the vicinity of RB-4 and RB-5, this portion of the plume is still within the hydraulic capture zone of the River Bank Extraction Wells (see Appendix B Figure 6.5-12; the hydraulic capture zone of the River Bank Extraction Wells extends to the east of these wells and under the river). Groundwater flow velocities between RB-4 and RB-5 are relatively slow in this area, but the area is still hydraulically controlled.	Okay.			Comment resolved.	90% BOD Apdx B Section 7.1
350	FMIT-64 Hualapai-50 Chemehuevi-50 Cocopah-50 CRIT-50	Append B 9.1.2 p. 56	First paragraph	The chemical interplay of TOC, Mn, Cr(VI), As etc. seems well described in the modeling, however, it may be advantageous during the first cycle of TOC injection, to monitor key elements (Mn, As) in the field at weekly intervals at selected wells to confirm that the natural system is	PG&E strongly agrees that collection of time-resolved information is critical to adequately understanding the biogeochemical processes affecting remedy performance and byproduct dynamics. However, given that the timescales required for transport of reagents from injection			Comment resolved pending review of 90% design.	Comment resolved.	O&M Manual Volume 2 Section 4.2.1

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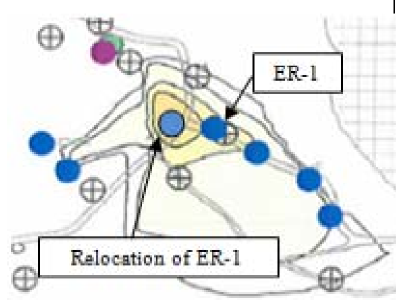
				responding generally as predicted.	wells to dose response wells are on the order of one to two months and establishment of microbial population equilibria within the IRZ are on the order of weeks, the monthly monitoring of dose response wells specified in the Sampling and Monitoring Program (Appendix L, Volume 2, Section 4) will provide adequate time-scale resolution for determining system performance. As initial monthly samples are collected, the changes will be assessed and more frequent sampling will be conducted if necessary. This language will be added to Appendix L, Volume 2 for this portion of the sampling program.					
351	DOI-158	Section 10.1, Page 60	"Figures 10.1-3 and 10.1-4 depict the model layers 2 and 4 Cr(VI) results for the 75-foot and 150-foot NTH IRZ well spacing after 30 years of simulated transport."	Based on the model runs and sensitivity analysis (as shown in Figures 10.1-3 and 10.1-4), residual Cr(VI) remains within the East Ravine in higher concentration due west of ER-1 after 30 years of operation. Would relocating ER-1 to the center of the remaining Cr(VI) "hot spot" area mitigate this area of higher concentration? 	As per technical discussions held after submittal of the 60% BOD, modifications will be made to the simulated bedrock in order better simulate fracture flow in the groundwater flow and transport model. Adjustments will include the reduction of mobile and immobile porosities to reflect secondary porosity features and the adjustment of the associated Cr(VI) retardation factor in the bedrock. These adjustments will not have an impact on hydraulic flow patterns but the transport modeling will demonstrate faster velocities associated with fracture flow. Additional provisional East Ravine Extraction Wells will be considered as per response to comment #109 DTSC-30.		Comment resolved.		Comment resolved.	90% BOD Apdx B Sections 6.2.1 and 6.2.3
352a	FMIT-65	Append B 10.4 Figures 10.4-1, 4-3, etc.	Figures 10.4-1, 4-3, etc.	For example, in Figure 10.4-1 & -3 which simulates Mn transport in Layer 2 of the model, for the lower sorption rate(s), the figure gives the impression that Mn generated will migrate to within the footprint of the river. Although cross- sections A-A' to F-F' in figures 6.4-3 to -8 appear to suggest that Layer 2 is actually representative of sediments beneath the river, and not at or above the river bed, these cross-sections are all N/S and do not show an E/W transect which crosses the river. Please confirm that the 2-D perspective shown in these figures does not represent migration into the river	The 2-D perspective represents migration of manganese in the aquifer under the river. Clarification will be added to the text and individual figures.			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Apdx B Section 10.4

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				itself.						
352b	Hualapai-51 Chemehuevi-51 Cocopah-51 CRIT-51	Append B 10.4 Figures 10.4-1, 4-3, etc.	Figures 10.4-1, 4-3, etc.	In Figure 10.4-1 & -3 which simulates Mn transport in Layer 2 of the model, for the lower sorption rate(s), the figure gives the impression that Mn generated will migrate to within the footprint of the river. Although cross-sections A-A' to F-F' in figures 6.4-3 to -8 appear to suggest that Layer 2 is actually representative of sediments beneath the river, and not at or above the river bed. These cross-sections are all north/south and do not show an east/west transect which crosses the river. Please confirm that the 2-D perspective shown in these figures does not represent migration into the river itself.	See response to comment #352a FMIT-65.			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Apdx B Section 10.4
353	FMIT-66 Hualapai-52 Chemehuevi-52 Cocopah-52 CRIT-52	Append B 10.5 p. 63		Section 6.4.7 stated that it was assumed that the freshwater source would be pre-treated to remove any naturally occurring arsenic to ND. 1) Please confirm that these model runs were done assuming an As concentration of ND for injected fresh water. 2) If the State Board allows the use of the freshwater source without pre-treatment, will these runs be repeated using the background As concentration in the freshwater source?	1) Arsenic associated with the freshwater injection was not included in the modeling evaluation based on the assumption that it would be treated to meet State Board requirements or lower. 2) Yes, if the State Board allows for use of the freshwater source without pre-treatment, these runs will be repeated using the background arsenic concentration in the freshwater source.			Comment resolved pending review of the 90% design and pending State Board decision.	Comment resolved.	90% BOD Apdx B Section 10.5
354	DOI-159	Section 10.14, Page 71		Based on the sensitivity analysis, what recommendation is offered with regards to amending riverbank extracted water with TOC to address elevated Cr(VI) concentrations?	If elevated Cr(VI) concentrations are present in the riverbank extracted water, the minimum amount of carbon should be added in order to effectively reduce the Cr(VI) and produce minimal byproducts. If byproducts are observed to be a greater risk upon implementation, there is flexibility in the design to oscillate the IRL wells receiving riverbank water with those receiving freshwater in order to mitigate the byproduct impact. IRL DQO-2 in the Sampling and Monitoring Plan (Appendix L, Volume 2) provides details on monitoring for Cr(VI) concentrations in riverbank extraction water and adjusting TOC amendments.		Comment resolved.		Comment resolved.	90% BOD Apdx B Section 10.14

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355	DOI-160	Figures 10.13-1 through 10.13-6		Recommend that the additional wells, IRL-6 and IRL-7, be identified in these graphics.	IRL-6 and IRL-7 will be labeled in these figures for clarification.		Comment resolved.		Comment resolved.	90% BOD Apdx B Figures 10.13-1 through 10.13-6
356	DOI-161	Section 10, Figures 10.1-1 through 10.15-4		Typically, the figures display the results of three sensitivity analyses for both Model Layer 2 and Model Layer 4. Variations in concentrations and flow rates are utilized to ascertain potential impacts to the remedial program (e.g., how sensitive is the model to changes). A review of the 109 drawings determined that there were minimal changes between the runs. For example, variations in TOC concentrations and groundwater withdrawal had little to no impact on the results. Please explain why there were minimal changes among nearly all the runs.	The fact that there were minimal changes between the simulated results in nearly all of the runs indicates that the majority of the parameters adjusted in the sensitivity runs had a low degree of sensitivity. However, a few of the runs indicated parameters of higher sensitivity (i.e., TOC concentrations, TOC/Cr(VI) trigger, manganese sorption/generation). Recognizing the difficulty in comparing the 109 drawings, a table summarizing the relative sensitivities of the 15 different sensitivity runs will be provided for the 90% Design Submittal. This will better illustrate the sensitivity of the various sensitivity runs to Cr(VI), manganese, and arsenic simulation.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Apdx B Section 10
357a	FMIT-67	Append B Section 2.3 Page 6,		The effect of this high range of TDS should be evaluated in the context of remedial system efficiency/performance. Was the dismissal of variable-density influence because of earlier evaluations that suggested it was not so important in affecting the plume migration? While this may be the case, current ASR technology suggests the anisotropy/layering and heterogeneity combined with density differences may strongly affect injection of freshwater of low TDS into a stratified density distribution based on reported orders of magnitude difference. The lower Cr(VI)-rich denser water may not be remediated with the assumption of uniform water density. The implication is that when the system starts up, and efforts are made to monitor, then adjust system performance, improvements to the system operating factors (i.e., flow rates, TOC injections, on/off durations etc.) may not be able to improve cleanup as predicted by the uniform density model predictions. Wells at this time will have been installed with little chance to improve spacing (which might need to be	Given the aquifer heterogeneity and vertical anisotropy, and the relatively high expected flow velocities within the system, advection-driven flows are expected to allow adequate horizontal flows to develop and be maintained at all depths between freshwater injection wells and riverbank extraction wells. See response to comment 384a. While it is acknowledged that effects of density-driven flow may occur, they are not expected. If however, effects of density are observed during remedy implementation (i.e. slower, or 'short-circuiting' of flushing within the deeper, more saline portions of the aquifer in areas some distance away from the injection wells), steps can be taken to mitigate these impacts. Potential steps include varying well flow rates over the entire screened zone, or packing off sections of upper screened intervals to increase flushing in deeper zones, effectively countering buoyant effects caused by density contrasts between injected freshwater and in-situ denser water. The 90% design will include a section describing in more detail how density effects will be			The FMIT transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7, 2014. The letter is included in **Attachment S** at the end of this table.	PG&E's response has been revised to reflect ongoing discussions between PG&E and TRC (Bob Prucha). On April 7, 2014, the FMIT transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 2.3

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				closer...even with the remaining contingent wells). The Tribe is not advocating for additional wells, just that wells be placed in the most efficient locations from the outset (while respecting sensitive areas) thereby potentially reducing the need for additional future wells. Either way, it is recommended that this factor be evaluated by the model.	mitigated, should they occur.					
357b	Hualapai-53 Chemehuevi-53 Cocopah-53 CRIT-53	Append B Section 2.3 Page 6,		The effect of this high range of TDS should be evaluated in the context of remedial system efficiency/performance. Was the dismissal of variable-density influence because of earlier evaluations that suggested it was not so important in affecting the plume migration? While this may be the case, current ASR technology suggests the anisotropy/layering and heterogeneity combined with density differences may strongly affect injection of freshwater of low TDS into a stratified density distribution based on reported orders of magnitude difference. The lower CrVI rich denser water may not be remediated with the assumption of uniform water density. The implication is that when the system starts up - and efforts are made to monitor, then adjust system performance - improvements to the system operating factors (i.e. flow rates, TOC injections, on/off durations etc.) may not be able to improve cleanup as predicted by the uniform density model predictions. Wells at this time will have been installed with little chance to improve spacing (which might need to be closer, even with the remaining contingent wells). Either way, it is recommended that this factor be evaluated by the model.	See response to comment #357a FMIT-67.			The Cocopah Indian Tribe transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 9, 2014. The letter is included in **Attachment S** at the end of this table.	See comment #357a FMIT-67. On April 9, 2014, the Cocopah Indian Tribe transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 2.3

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358	FMIT-68 Hualapai-54 Chemehuevi-54 Cocopah-54 CRIT-54	Section 3.0 p. 3-1	*Central to the design process is the groundwater modeling effort which was used to refine/ optimize the key remedy features.*	Where are specific optimization/refinement criteria used to guide development of the remedy design and operational strategy?	The specific optimization/ refinement criteria to guide the development of the remedy design and operational strategy are: 1) reduce the anticipated remedial timeframe for effective capture and treatment of the Cr[VI] plume; 2) minimize the necessary remediation infrastructure [i.e., total number of new well locations] or "footprint" of the remedial system; and 3) minimize the impact of potential byproducts [i.e., arsenic and manganese]. Specific design elements of the individual remedial design components are presented in Appendix B and Section 3.2 of the 60% BOD. In addition, a table of optimization criteria will be developed reflecting the remedial design specifications and parameters encountered during well installation and operation.			Comment resolved pending review of the 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.1.4 90% BOD Apdx B Section 6.4
359	FMIT-69 Hualapai-55 Chemehuevi-55 Cocopah-55 CRIT-55	Section 3.1.1p. 3-1	*In addition, the auto-calibration program PEST was employed torefine the calibration and to reduce the effects of uncertainty in each calibration target.*	How did PEST reduce uncertainty in each calibration target? How exactly did PEST refine the model calibration? A concern exists about how well the hydraulic aquifer parameters have been calibrated and how well-tested the distribution is, as implied by the complex distribution presented for each layer (i.e., Layers 2, 3 and 4 in Figures 4.5-2 through 4.5-4, respectively). Clearly no data points exist beneath the River, but the hydraulic property distribution is complex. The concern arises because the system is calibrated to existing “unstressed” conditions relative to what will happen when the operating remediation system stresses the system well outside of calibration, both in terms of changes to heads, but also in terms of flows into/out of the remedial area from external boundaries including the river and lateral boundaries, where little characterization (or conceptualization) has occurred. PEST was utilized to develop complex parameter distributions for hydraulic conductivity (as outlined in Section 3.2, in the Report “Groundwater Model Update Report, July 2005”). It	Text will be modified as follows: “*In addition, the auto-calibration program PEST was employed to refine the calibration ~~and to reduce the effects of uncertainty in each calibration target~~*”. PEST refined the model calibration because the first stage of the calibration was manual through a trial-and-error approach until an approximate match was achieved. The second stage then involved PEST where it was run numerous times with incremental parameter adjustments to reduce error variance (CH2M HILL, 2005). Based on the available data the groundwater flow model was calibrated against (a) long term average groundwater levels, (b) average monthly floodplain levels responding to fluctuating river levels, (c) short-term responses to pump testing events, and (d) plume development over time) the groundwater flow model was finalized and approved by DTSC for use in the CMS. The Kh:Kv ratios were refined with PEST as described in Section 3.2 of the Groundwater Model Update Report (CH2M HILL, 2005). PEST was only allowed to adjust parameters			The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	PG&E’s response has been revised to reflect ongoing discussions between PG&E and TRC (Bob Prucha). On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Sections 3.1.1 and 3.1.5

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				is unclear whether the complex Kh:Kv ratios presented in Figures B-6 were determined through PEST. Given the importance and high uncertainty associated with the hydraulic conductivity values, both horizontally and vertically, it is surprising that a sensitivity analysis was not conducted to assess the full range of possible remedial system performance. Remedial systems are typically designed conservatively to allow for unexpected variances in field conditions during remedy implementation.	(including Kv) in the area of the floodplain, which shows up in Figure 8-6 as the oval shaped area of earth tone color. Outside the floodplain area, Kv was calculated as a thickness weighted geometric mean of the stratigraphic units assigned to each model cell. The complex pattern of geometric triangles in the areas of the model north and east of the Topock Site is an artifact of rounding of the Kv values to fit the color scheme of the figure. The values in the model actually vary just slightly above and below 10, causing the color scale to “flicker” between the lighter green for values less than 10 and the darker green for values greater than 10.. Adjustments in the riverbed conductance and evapotranspiration parameters led to little variation in calibration results indicating the low degree of sensitivity to these parameters in the calibration scenarios. As a result, these parameters were not adjusted during the PEST analysis. By contrast, the model was found to be much more sensitive to K and Kh/Kv, especially in the floodplain transient data calibration (matching changes in monthly average water levels over the course of the year and water level response during short-term aquifer tests). It is acknowledged that there is not a single unique solution for the calibration of the groundwater flow model, and variations in parameter values could produce similar calibration results. The hydraulic stress on the aquifer will be different when the final remedy is in operation than it was during the model calibration. The groundwater flow and solute transport model will be updated and recalibrated if significant differences from the current model construction are encountered with respect to hydrogeologic characterization or remedy performance. This will allow the model to be used as a tool to evaluate the performance and guide the operation of the remedial design					

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					after including the adjusted data. See response to comment 653 DOI-658. A section will be added to the 90% BOD report to describe model update procedures.					
360	FMIT-70 Hualapai-56 Chemehuevi-56 Cocopah-56 CRIT-56	Section 3.1.1 p. 3-1	*This calibration procedure yielded a highly variable distribution of hydraulic conductivities to better reflect the local-scale geologic heterogeneities that characterize the natural system.*	Is this realistic considering the highly variable K configuration beneath the river with no supporting data? What should be done is to test a range of hydraulic properties beneath the river to see how much calibration and predictions change.	It is recognized that the complexity of K array beneath the river is not supported by data, however this array did result in some improvement of the match to calibration targets and the overall range of K is consistent with what has been measured. Despite the lack of hydraulic data beneath the river, the simulated K distributions represent an estimated interpolation of K values based on data collected in the vicinity of the river. Hydrogeologic interpretation is important in simulating areas where limited data are available. It is acknowledged that there is not a single unique solution for the calibration of the groundwater flow model, and variations in parameter values could produce similar calibration results. The hydraulic stress on the aquifer will be different when the final remedy is in operation than it was during the model calibration. The groundwater flow and solute transport model will be updated and recalibrated if significant differences from the conceptual site model are encountered with respect to hydrogeologic characterization or remedy performance. This will allow the model to be used as a tool to evaluate the performance and guide the operation of the remedial design after including the adjusted data. See response to comment 653 DOI-268. A section will be added to the 90% BOD report to describe model update procedures.			The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	PG&E's response has been revised to reflect ongoing discussions between PG&E and TRC (Bob Prucha). On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.1.5
361	FMIT-71 Hualapai-57 Chemehuevi-57 Cocopah-57 CRIT-57	Section 3.1.1 p 3-1 to 3-2	*In general, the groundwater flow submodel honors the hydraulic conductivity distribution and boundary conditions.*	In general? Where doesn't it, and why? Also, were recent changes in bedrock included in either the regional re-calibration or latest sub- scale Modflow model? What was done to confirm flow conditions in the regional model are	The text will be edited as follows (deleted text shown in ~~strikethrough~~ typeface): "~~In general, t~~ The groundwater flow submodel honors the hydraulic conductivity distribution and boundary conditions... ~~established by the original regional model~~ extracted from the regional flow model."			Comment resolved pending review of the 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the	90% BOD Section 3.1.1

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				consistent w/those in the submodel?	Structural changes due to the east ravine investigation were integrated into both the regional flow model and the submodel for the 60% BOD. Additional edits to the bedrock simulation in the solute transport model will be integrated into the 90% Design Submittal to better account for flow in bedrock fractures. These edits will include reductions in the mobile and immobile porosity values and the Cr(VI) retardation factor in bedrock that were discussed following the submittal of the 60% BOD. Consistency between the flow conditions in the regional model and those in the submodel were confirmed by directly comparing the simulated groundwater flow results between the two models. A well construction evaluation strategy will be presented in the 90% design. The discussion of use of the model during that period will be included in the strategy.			letters are included in **Attachment S** at the end of this table.	resolution in the 90% design.	
362	FMIT-72 Hualapai-58 Chemehuevi-58 Cocopah-58 CRIT-58	Section 3.1.2p. 3-2	*In addition, a sensitivity analysis was conducted in which various parameters (e.g., Cr[VI] partition coefficient, manganese generation/ attenuation rate, and arsenicgeneration/attenuation rate) were adjusted until a reasonable qualitative and quantitative fit to the observed data was obtained.*	Is this really a "sensitivity" analysis, or a model calibration?	Text will be modified for clarification of the sensitivity analysis: "In addition, a sensitivity analysis was conducted in which various parameters (e.g., Cr[VI] partition coefficient, manganese generation/ attenuation rate, and arsenic generation/ attenuation rate) were adjusted <u>to evaluate the relative impact on the simulated solute transport model results with respect to Cr(VI), manganese, and arsenic</u> ~~until a reasonable qualitative and quantitative fit to the observed data was obtained~~." Relative sensitivities of each of the selected parameters/ conditions evaluated with the model will be tabulated to further illustrate the results of the sensitivity analyses and will be included in the 90% design submittal.			Comment resolved pending review of the 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Sections 3.1.2 and 3.1.4
363	FMIT-73 Hualapai-59 Chemehuevi-59	Section 3.2.1.1 p. 3-5	*Wells will be amended with carbon substrate and injected into*	Is it really net flow of zero if carbon is added? What about imported fresh water injected into IRL1 and IRL2. Isn't this a net increase in flow?	The net flow of 0 gpm for the NTH IRZ refers to the balance of 300 gpm NTH IRZ extraction and 300 gpm NTH IRZ injection. Carbon amendment is not anticipated to have a significant			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Section 3.2.1 90% BOD Apdx B Section 6.4-1

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	Cocopah-59 CRIT-59		*the NTH IRZ line via the 24 NTH IRZ Injection Wells, resulting in a net flow of 0 gpm.*		impact on the cumulative injection rate. The NTH IRZ statement does not refer to elements of the Inner Recirculation Loop or freshwater injection. Text will be added to the 90% design to reflect this clarification.					
364a	FMIT-74	Section 3.2.1.1 p. 3-5	*Based on the results of groundwater flow and solute transport modeling, the current recirculation system configuration—injection wells spaced along the NTH IRZ line with extraction wells located at the ends and in minimal places along the line—will allow for adequate lateral dispersion of organic carbon while minimizing the potential for the extraction of carbon substrate or treated water.*	Were "adequate" lateral dispersion of OC and minimizing potential extraction of OC or treated water the only constraints? How were different optimization constraints considered or weighted to come up with the final configuration? For example, how were constraints (i.e., minimizing generation of secondary geochemical species or minimizing overall cleanup time) incorporated into the final remedy configuration? What are details related to defining the constraint for minimizing cleanup? Was it minimum time to minimize Cr(VI) conversion to Cr(III) within 30 years, for the entire plume, or was it total reduction in overall plume volume of Cr(VI) or Cr(III)? It is important to distinguish between them. What is meant by "in minimal places"?	The three optimization criteria are to minimize the remedial clean-up time of the Cr(VI) plume, minimize infrastructure, and minimize byproduct generation. These three optimization criteria were considered concurrently in the design of the remedy. A table of optimization criteria will be developed reflecting the remedial design specifications and parameters encountered during well installation and operation. In order to minimize the remedial clean-up time of the Cr(VI) plume (first optimization criterion listed above), the NTH IRZ should provide adequate lateral dispersion of carbon and minimize the potential extraction of carbon. The text "in minimal places" will be revised to "in the central portion of the NTH IRZ".			Comment resolved pending review of the 90% design. The FMIT transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7, 2014. The letter is included in **Attachment S** at the end of this table.	Comment resolved. On April 7, 2014, the FMIT transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Sections 3.1.4 and 3.2.1 90% BOD Apdx B Table 6.4-1
364b	Hualapai-60 Chemehuevi-60 Cocopah-60 CRIT-60	Section 3.2.1.1 p. 3-5	*Based on the results of groundwater flow and solute transport modeling, the current recirculation system configuration—injection wells spaced along the NTH IRZ line with extraction wells located at the ends and in minimal places along the line—will allow for adequate lateral dispersion of*	Were "adequate" lateral dispersion of OC and minimizing potential extraction of OC or treated water the only constraints? How were different optimization constraints considered or weighted to come up with the final configuration? For example, how were constraints (i.e., minimizing generation of secondary geochemical species or minimizing overall cleanup time) incorporated into the final remedy configuration? What are details related to defining the constraint for minimizing cleanup? Was it minimum time to minimize CrVI conversion to CrIII within 30 years, for the entire plume, or was it total reduction in overall plume volume of CrVI or CrIII? It is important to distinguish between them.	See response to comment #364a FMIT 74.			Comment resolved pending review of the 90% design. The Cocopah Indian Tribe transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 9, 2014. The letter is included in **Attachment S** at the end of this table.	Comment resolved. On April 9, 2014, the Cocopah Indian Tribe transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Sections 3.1.4 and 3.2.1 90% BOD Apdx B Table 6.4-1

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			organic carbon while minimizing the potential for the extraction of carbon substrate or treated water.	What is meant by "in minimal places"?						
365	FMIT-75 Hualapai-61 Chemehuevi-61 Cocopah-61 CRIT-61	Section 3.2.1.1 p. 3-5	*In general, the purpose of the NTH IRZ Extraction Wells is to preserve the natural west to east flow gradient,….*	Is this really the main purpose? Would this be another optimization constraint on remedial design alternatives involving changes in flow rate, locations, depths etc.?	Well locations, well spacing, and well rates were all considerations during the remedial design process. The text will be edited as follows (inserted text shown in <u>underline</u> typeface and deleted text shown in ~~strikethrough~~ typeface): "~~In general, t~~ <u>T</u>he ~~purpose of the~~ NTH IRZ Extraction Wells <u>were designed to generate sufficient flow rate to support the NTH IRZ Injection Wells</u> ~~is to preserve the natural west to east flow gradient and, thus, encourage flow through the IRZ~~. The three northern NTH IRZ Extraction Wells (IRZ-1, IRZ-5, and IRZ-9) were positioned to minimize the number of NTH IRZ wells while offering hydraulic control of the northern, low concentration end of the Cr(VI) plume and minimizing the extraction of reduced water containing organic carbon or dissolved minerals. The NTH IRZ Extraction Well location situated near the center of the NTH IRZ line (IRZ-23) was positioned to maintain and accentuate the eastern flow component of the groundwater, and adjustments will be made to the injection flow rates and carbon dosing in the vicinity of this well location in order to alleviate potential well fouling (see Appendix L, the Draft O&M Manual)…" A table of optimization criteria will be developed reflecting the remedial design specifications and parameters encountered during well installation and operation.			Comment resolved pending review of 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Sections 3.1.4 and 3.2.1 90% BOD Apdx B Section 6.4.1
366	FMIT-76 Hualapai-62 Chemehuevi-62 Cocopah-62 CRIT-62	Section 3.2.1.1p. 3-5	*The three northern NTHIRZ Extraction Wells (IRZ-1, IRZ-5, and IRZ-9) were positioned to minimize the number of NTH IRZ wells while*	This sounds like another optimization criterion. How is this weighted along with all the other criteria?It is recommended that a table of all optimization criteria be prepared and relative weights shown. Which was most important, which the least?A table showing all prioritized constraints should actually help going forward to find the best optimization into 90% design and during/post-	Well locations, well spacing, and well rates were all considerations in designing the NTH IRZ in order to prevent the migration of Cr(VI) towards the floodplain. All criteria were important and interrelated in the design of the NTH IRZ. The exhibits/tables will be expanded in the 90% Design Submittal to better illustrate the considerations taken into account for the design of each			Comment resolved pending review of 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.1.4

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			offering hydraulic controlof the northern, low concentration end of the Cr(VI) plume and minimizing the extractionof reduced water containing organic carbon or dissolvedminerals.	startup.There are many considerations and they should be clearly tracked.	remedial component. A table of optimization criteria will be developed reflecting the remedial design specifications and parameters encountered during well installation and operation.			this table.		
367a	FMIT-77	Section 3.2.1.1 p. 3-5	*However, given the limited unconsolidated aquifer thickness at the southern end of the NTH IRZ (approximately 10 feet as compared to 300 feet at the northern end) and the injection volumes necessary to maintain an effective NTH IRZ, locating the NTH IRZ Extraction Wells to the north provided greater advantage in the model simulations.*	This brings up the issue of whether there should have been another optimization objective that relates, not so much to reducing areal footprint or volume of Cr(VI) in the shortest time possible, but that attempts to reduce overall source-path- receptor risk. Which areas pose the highest risk to potential receptor(s).	The primary potential receptor at the Site is the Colorado River. While optimization objectives are to minimize the Cr(VI) remedial timeframe, minimize infrastructure, and minimize byproduct generation, the overall remedy is designed to prevent migration of Cr(VI) to the river. The NTH IRZ is designed to remediate and/or provide hydraulic capture of the Cr(VI) plume as it migrates towards the floodplain (to effectively "cut-off" the plume). The River Bank Extraction Wells were designed to hydraulically control the deep portions of the floodplain currently impacted with Cr(VI); and the East Ravine Extraction Wells were designed to provide hydraulic capture of the Cr(VI) groundwater impacts in the bedrock to prevent migration to the river. A table of optimization criteria will be developed reflecting the remedial design specifications and parameters measured or observed during well installation and operation.			Comment resolved pending review of 90% design. The FMIT transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7, 2014. The letter is included in **Attachment S** at the end of this table.	Comment resolved. On April 7, 2014, the FMIT transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.1.4
367b	Hualapai-63 Chemehuevi-63 Cocopah-63 CRIT-63	Section 3.2.1.1 p. 3-5	*However, given the limited unconsolidated aquifer thickness at the southern end of the NTH IRZ (approximately 10 feet as compared to 300 feet at the northern end)*	This brings up the issue of whether there should have been another optimization objective that relates, not so much to reducing areal footprint or volume of CrVI in the shortest time possible, but that attempts to reduce overall source-path-receptor risk. Which areas pose the highest risk to receptor(s)?	See response to comment #367a FMIT-77.			Comment resolved pending review of 90% design. The Cocopah Indian Tribe transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 9, 2014. The letter is included in **Attachment S** at the end of this table.	Comment resolved. On April 9, 2014, the Cocopah Indian Tribe transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.1.4

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			and the injection volumes necessary to maintain an effective NTH IRZ, locating the NTH IRZ Extraction Wells to the north provided greater advantage in the model simulations.							
368	FMIT-78 Hualapai-64 Chemehuevi-64 Cocopah-64 CRIT-64	Section 3.2.2.1 p. 3-12	*It is anticipated that three to five of the River Bank Extraction Wells (shown on Figure 3.0-1) will be operated at any given time based on the need to control potential migration of Cr(VI) located downgradient of the NTH IRZ, control byproduct migration in the deeper portion of the aquifer, and enhance hydraulic gradients to accelerate the remediation timeframe, while simultaneously minimizing the effects of the river bank extraction on development and maintenance of the NTH IRZ and/or maintenance of the natural*	Is this another optimization constraint not listed among the 3 major constraints? How would the natural reducing rind be "maintained"?	Yes, while the three major constraints governing the remedial design (minimize remedial timeframe, minimize infrastructure, and minimize byproduct generation) are still the most critical, the consideration of preserving the existing reducing rind to the extent possible was still important in the design of the River Bank Extraction Wells. For clarification, the text will be edited to replace "minimizing the effects of the river bank extraction on development and maintenance of the NTH IRZ and/or maintenance of the natural reducing rind located along the Colorado River" with "minimizing the effects of the river bank extraction on development and distribution of the NTH IRZ reducing zone and minimizing the impact to the natural reducing rind located along the Colorado River". A table of optimization criteria will be developed reflecting the remedial design specifications and parameters encountered during well installation and operation.			Comment resolved pending review of 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Sections 3.1.4 and 3.2.2

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			reducing rind located along the Colorado River.							
369	FMIT-79 Hualapai-65 Chemehuevi-65 Cocopah-65 CRIT-65	Section 3.2.2.1 p. 3-12	*Monitoring wells will be used to monitor the effectiveness of the NTH IRZ, and to help determine the ideal pattern of River Bank Extraction Well operations to maintainan appropriate balance of these operational goals.*	So in effect, there are non-modeling optimization constraints too. Can these be added to the growing matrix of optimization constraints to clearly show what is shaping decisions now on rates, locations, on/off durations, screen-zones etc.... and then future changes to the system?	Well locations, well spacing, and well rates were all considered in the remedial design to address the three major constraints (minimize remedial timeframe, minimize infrastructure, and minimize byproduct generation). These will be added to the matrix in the 90% BOD to describe the remedial design criteria. This table of optimization criteria will reflect the remedial design specifications and parameters encountered during well installation and operation. A well construction evaluation strategy will be presented in the 90% design. The discussion of use of the model during that period will be included in the strategy.			Comment resolved pending review of the 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Sections 3.1.4 and 3.1.5
370	FMIT-80 Hualapai-66 Chemehuevi-66 Cocopah-66 CRIT-66	Section 3.2.2.1 p. 3-12	*The expected total average extraction flow rate of these wells is 150 gpm, although flexibility will be provided to increase this flow rate to 500 gpm (see Table 3.2-2).*	How was 500 gpm determined? Is this enough to account for the cumulative effects of uncertainty in flows, transport, geochemical reactions etc?	The 500 gpm maximum was determined by increasing the nominal flow rate by more than a factor of three to provide hydraulic capture in the event that the regional volumetric flow rates are up to three times higher than anticipated. While this is unlikely, the flexibility was incorporated into the model for conservativeness. The 500 gpm maximum is more than adequate to account for uncertainty in flows. An additional model run at 500 gpm will be used to assess the implications of this maximum flow rate and the results will be accounted for in the O&M plan presented in the 90% design.			Comment resolved pending review of the 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.2.2 90% BOD Apdx B Section 10.3
371	FMIT-81 Hualapai-67 Chemehuevi-67 Cocopah-67 CRIT-67	Section 3.2.2.1 p. 3-14	*.... (3) accommodation of uncertainties in field implementation.*	Can this be explained in more detail? What about uncertainties in all the various flow, transport and geochemical model inputs so far? How does one really show this uncertainty as it relates to TOC upper range?	Uncertainties in field implementation could potentially include variations in local geochemistry (i.e., dissolved oxygen, nitrate) or microbial ecology (e.g., carbon consumption by sulfate reducers or methanogens) that would require additional TOC injection to develop the appropriate reducing conditions. This uncertainty will be mitigated through monitoring at IRL dose response wells and making TOC dosing adjustments accordingly, as specified in the O&M Manual (Appendix L), Volume 2,			Comment resolved pending review of 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.2.2.1, Organic Carbon Dosing and Delivery Strategy

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					Section 2.2.2, IRL DQO-2. The text will be updated to include these details and a reference to the O&M Manual. Similar text will be added to Table 3.2-1.					
372	FMIT-82 Hualapai-68 Chemehuevi-68 Cocopah-68 CRIT-68	Section 3.2.2.1 p. 3-14	*Injections will be timed to allow for adequate dispersion of the injectate away from the well.*	What is the qualitative and quantitative definition of "adequate dispersion" away from a well?	Adequate dispersion is demonstrated by the development of reducing conditions between the injection wells thus establishing a complete barrier to ensure that Cr(VI) in groundwater is effectively reduced (below 32 ppb). This will be evaluated by monitoring TOC concentrations, Cr(VI) concentrations, and reducing conditions within and downgradient of the IRL wells.			Comment resolved.	Comment resolved.	90% BOD Section 3.2.2
373	FMIT-83 Hualapai-69 Chemehuevi-69 Cocopah-69 CRIT-69	Section 3.2.2.3 p. 3-16	*The Inner Recirculation Loop will be implemented and operated using an adaptive approach, similar to operation of the NTH IRZ system— data will be collected from monitoring wells within the Inner Recirculation Loop, and operations will be modified to optimize the remedy performance.*	How does modeling fit into this "adaptive" approach, if at all?	Modeling will be used in conjunction with the observed field data. By comparing the model predictions to new field data collected during installation of the remedial system, the predictive accuracy of the model can be assessed. If there are significant variations in the actual remedy performance as compared to the simulated solute transport model, the flow and/or solute transport models can be updated to better reflect site conditions. The updated model can then be used to evaluate the system performance and guide adjustments in the operation of the remedial system. See response to comment #653 DOI-268. A section will be added to the 90% BOD report to describe model update procedures.				The comment was resolved verbally at the February 12, 2014 CWG. Comment resolved.	90% BOD Section 3.1.5
374	FMIT-84 Hualapai-70 Chemehuevi-70 Cocopah-70 CRIT-70	Figure 3.1-1	*Conceptual Final Groundwater Remedy Cross-Section Locations*	South of indicated rind, is there a greater weighting of Cr(VI) removal from the system due to lack of natural reducing conditions?	For the cross-section, the reducing zone delineations were terminated at the bedrock contact for the purpose of the figure; this does not reflect lack of reducing conditions. , The East Ravine Extraction Wells are designed to hydraulically control Cr(VI) concentrations associated with groundwater in bedrock. See also response to comment #377 FMIT-87/Hualapai-73.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Figure 3.1-1
375	FMIT-85 Hualapai-71	Figure 3.1-3	*Conceptual Final*	Does the fact that the plume occupies the lower part of the unconsolidated	See response to comments #357a FMIT-67 and #384a FMIT-94.				PG&E's cited responses have been revised to reflect	90% BOD Apdx B Section 2.3

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	Chemehuevi-71 Cocopah-71 CRIT-71		*Groundwater Remedy Cross-Section B-B'*	material, probably along with more dense, higher TDS water suggest it will also be more difficult or complicated to remediate with current plan unless density dependent flow conditions are evaluated?					discussions between PG&E and TRC (Bob Prucha). Comment resolution is pending review/okay by the Tribes.	
376	FMIT-86 Hualapai-72 Chemehuevi-72 Cocopah-72 CRIT-72	Append B Section 2.0p. 3	*For the Site, the conceptual model forms the single most important guide for the design and operation of the proposed remediation system, as it is the basis for the numeric modeling, comprised of groundwater flow and contaminant fate and transport that simulate the operation of the remediation system.*	This sentence (1st paragraph) says, the conceptual model represents the most important guide for design and operation of the proposed remediation system. As such, presenting a more detailed discussion of the conceptual flow, fate/transport and geochemical models, for the existing system AND for proposed remediation system (complete with injection/extraction, TOC etc) and how they relate to each other is critical for reviewers to appreciate all of the factors (and assumptions) that go into development of the complex models used as the primary tool to support design of the remediation system, and determine how it will be operated. Simple flow arrows typically included are not included (and should be included) on a diagram that depicts current/proposed conditions. A simple narrative here without supporting graphics is of only limited value. Previous documents have shown this information, but it is difficult to track down and see everything together in one piece that reflects current understanding and knowledge of how the system works.	Flow arrows/flow fields can be added to Figures 6.5-1 to 6.5-12 to better illustrate groundwater flow directions with respect to ambient flow conditions, active remedy flow conditions, and hydraulic capture of active extraction wells. A conceptual operational diagram will also be prepared and included in the 90% design to illustrate the source of extracted water and where it will be injected for each remedial element.			Comment resolved pending review the 90% design documents.	Comment resolved.	90% BOD Apdx B Sections 4 and 6.4
377	FMIT-87 Hualapai-73 Chemehuevi-73 Cocopah-73 CRIT-73	Append B Section 2.2 p. 5	*The saturated thickness of the alluvial aquifer is approximately 100 feet in the floodplain and thins to the south, pinching out along locations where the Miocene Conglomerate and igneous/ metamorphic rocks outcrop.*	Can the location of this point be indicated on a map? Isn't this where the rind also disappears and as such represents an important factor in the conceptual flow and fate/transport model?	Yes, this contact can be identified in a figure. The bedrock contact is evident with the abrupt change in hydraulic conductivity values in Figures 4.5-1 to 4.5-4 of Appendix B (60% BOD) but this contact can be clearly labeled in the 90% BOD.			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Apdx B Section 4.2

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378	FMIT-88 Hualapai-74 Chemehuevi-74 Cocopah-74 CRIT-74	Append B Section 3.4.3 p. 15	*The relationship between TOC and manganese concentration is shown in Figure G13 of Appendix G of the CMS/FS, while Figure G14 of the CMS/FS shows the relationship for TOC and arsenic. In the solute transport model, these correlations are used as the basis for manganese and arsenic generation. Manganese and arsenic generation rates were calculated based on the average amount of byproduct observed in solution for TOC concentrations greater than 10 mg/L and less than 100 mg/L within the upland and floodplain ISPT datasets.*	Rather than use the Mn factor of 0.016, which appears to represent an average or best-case scenario, the range of concentrations of Mn vs. TOC should be considered in the design? Also, Figures G13 and G14 in the CMS/FS are derived from sites other than Topock (i.e., from page 33/45 in App G in CMS/FS it states *"Empirical data demonstrates this as shown in Figures G12, G13, and G14 which depict relative trends of iron, manganese, and arsenic versus total organic carbon (TOC) observed at several sites where large-scale, long-term IRZ remedies are currently being applied."*). Are these applicable to the particular geochemical conditions at Topock?	The basis for the relationship between organic carbon concentration and generation of dissolved manganese and arsenic is from the results of the in-situ pilot tests (ISPTs) conducted at the Topock site, both in the upland and floodplain. In the case of manganese, the base case was developed using the average concentration generated at organic carbon concentrations between 10 and 100 mg/L (as described in Section 3.4.3). Manganese is naturally present in Topock soil at higher concentrations than arsenic and therefore was detected at higher concentrations in the dissolved phase, as compared to arsenic, as a result of the application of organic carbon. Because of this, the arsenic generation rate is lower than that for manganese, and this rate is also based on the Topock ISPTs. Section 3.4.3 refers to Figures G13 and G14 in the CMS/FS because these show the relatively predictable trend in manganese and arsenic generation as related to organic carbon concentration. This predictable trend forms the technical basis for the development of generation rates for the Topock design; however the rates themselves are based on the Topock ISPT data and are therefore appropriate for the geochemical conditions at the Topock site. The sensitivity analysis captures a wide range of generation rates, and covers the range of manganese, arsenic, and TOC concentrations relevant to operation of the remedy. These points will be made clearer in Section 3.4.3 of Appendix B in the 90% Design Submittal. Text will be included in the 90% design directing the reader to the details of the manganese sensitivity analysis and summarizing the results of that analysis.			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Apdx B Section 3.4.3
379	FMIT-89 Hualapai-75 Chemehuevi-	Append B Section 4.5 p. 20	*The hydraulic conductivity distribution of the upper four*	This indicates 'highly heterogeneous' but what is vertical to horizontal anisotropy if any? This does not appear on the associated figures, but	Figures displaying the distribution of the Kh:Kv zonation will be generated and presented in the 90% design. These figures will be consistent with				The comment was resolved verbally at the February 12, 2014 CWG. Comment resolved.	90% BOD Apdx B Section 4.5 90% BOD Apdx B Figures 4.5-6, 4.5-7, and 4.5-8

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	75 Cocopah-75 CRIT-75		*layers representing the alluvial aquifer were simulated as highly heterogeneous layers as depicted on Figures 4.5-1 to 4.5-5. All hydraulic conductivity values in the submodel were assigned on the basis of the original regional groundwater flow model properties.*	is important in the overall performance of the remedial system, especially if density effects are relevant.	the Kh:Kv figures previously presented in the 2005 Groundwater Flow Model Report but will reflect the adjustments made to the groundwater flow model after the East Ravine investigation.					
380	FMIT-90 Hualapai-76 Chemehuevi-76 Cocopah-76 CRIT-76	Append B Section 6.3 p.37	*A sensitivity analysis quantifies the impact that variations on model parameter values have on differences between Site observations and model predictions.*	This is not the standard definition of sensitivity analysis. ASTM standards for conducting a sensitivity analysis show there are there are two types: a) calibration sensitivity and b) predictive sensitivity. The Tribe recommends that both types of sensitivity analyses be performed.	The groundwater flow model was calibrated against (a) long term average groundwater levels, (b) average monthly floodplain levels responding to fluctuating river levels, (c) short-term responses to pump testing events, and (d) plume development over time. A solute transport model was adopted following the choice of remedy in the CMS, with the approved hydraulic model forming the basis of this model. Predictive sensitivity was applied to the solute transport model, since prediction of remedy success was made on the basis of concentration of Cr(VI) and COPCs A predictive sensitivity analysis was conducted using the solute transport model by varying multiple solute transport model parameters and observing the impact on Cr(VI), TOC, Mn, and As. A calibration sensitivity analysis is not applicable for the solute transport model as the full scale remedial design has not been implemented and therefore no data exists to calibrate the solute transport model against for future pumping conditions. Text will be added to clarify the basis for selecting the specific subset of possible parameters and remedial system operational rates evaluated				The comment was resolved verbally at the February 12, 2014 CWG. Comment resolved.	90% BOD Apdx B Section 6.3

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					during this sensitivity analysis. The relative sensitivities of variables will be organized and summarized in a sensitivity table to better illustrate the degree of sensitivity, in addition to presenting the simulated solute transport modeling results at 10 and 30 years for Cr(VI), TOC, Mn, and As.					
381a	FMIT-91	Append B Section 6.3 p. 37	*However, various aspects of the Cr(VI) plume and behavior of manganese and arsenic were analyzed in detail with the solute transport model to determine an appropriate range of solute transport parameters to use for the predictive modeling.*	Is it possible to explain why there was no sensitivity analysis of flow conditions and their influence on the remedy? The sensitivity of flow conditions on the overall remedial system performance likely dominates the sensitivity of system response to other factors. It is important to know how to rank these factors, especially when the system is started up and future changes are needed. There are many factors that can be adjusted, or that may explain why the system might not perform as expected. Unexpected conditions of performance might be likely, given the relatively high number of factors and assumptions associated with model predictions (flows, fate/transport, geochemical processes etc). What is the sensitivity of screen depth, well placement, flow rates, especially when key parameters are adjusted? What is the sensitivity of K distributions (especially under river and surrounding known data areas - where it is assumed)? What about the riverbed conductance? Was local scaled-sensitivity analysis to determine and rank which parameters the flow, transport and geochemical reactions are most sensitive to ever performed or considered?	See comments 359 FMIT-69 and 360 FMIT-70. Variations in hydraulic conductivity would impact the volumetric flow through the aquifer which was evaluated by varying the remedial design flow rates (riverbank extraction well rates, freshwater injection well rates, and NTH IRZ well spacing and rates) in the solute transport model sensitivity analysis (Appendix B Section 10). Utilizing the data collected during installation and implementation of the remedial design would be more beneficial than basing the design operation on a theoretical sensitivity analysis. The remedial design components were designed through interpretation of the flow and hydraulic conditions from observed data. These remedial components were then simulated using the groundwater flow and solute transport model. With respect to the remedial design, the proposed remedial design layout would not change, but the implementation of provisional wells or variations in well injection/extraction rates can be adjusted. Variations in encountered hydraulic properties or overall system performance will be integrated back into the groundwater flow and solute transport model to determine the impact on the proposed remedial timeline. It is acknowledged that there is not a single unique solution for the calibration of the groundwater flow model, and variations in parameter values could produce similar calibration results. The hydraulic stress on the aquifer will be different when the final remedy is in operation than it was during the model calibration. The groundwater flow and solute				The comment was resolved verbally at the February 12, 2014 CWG. Comment resolved.	90% BOD Apdx B Section 6.3

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					transport model will be updated and recalibrated if significant differences from the conceptual site model are encountered with respect to hydrogeologic characterization or remedy performance. This will allow the model to be used as a tool to evaluate the performance and guide the operation of the remedial design after including the adjusted data. See response to comment 653 DOI-268. A section will be added to the 90% BOD report to describe model update procedures.					
381b	Hualapai-77 Chemehuevi-77 Cocopah-77 CRIT-77	Append B Section 6.3 p. 37	*However, various aspects of the Cr(VI) plume and behavior of manganese and arsenic were analyzed in detail with the solute transport model to determine an appropriate range of solute transport parameters to use for the predictive modeling.*	Is it possible to explain why there was no sensitivity analysis of flow conditions and their influence on the remedy? The sensitivity of flow conditions on the overall remedial system performance likely dominates the sensitivity of system response to other factors. It is important to know how to rank these factors, especially when the system is started up and future changes are needed. There are many factors that can be adjusted, or that may explain why the system might not perform as expected. Unexpected conditions of performance might be likely, given the relatively high number of factors and assumptions associated with model predictions (flows, fate/transport, geochemical processes etc.) What is the sensitivity of screen depth, well placement, flow rates, especially when key parameters are adjusted. What is the sensitivity of K distributions (especially under river and surrounding known data areas - where it is assumed). What about the riverbed conductance? Was local scaled-sensitivity analysis to determine and rank which parameters the flow, transport and geochemical reactions are most sensitive to ever performed or considered?	See response to comment #381a FMIT-91.				See comment #381a FMIT-91.	90% BOD Apdx B Section 6.3
382	FMIT-92 Hualapai-78 Chemehuevi-	Append B Section 6.3 p. 37	*By adjusting parameters, such as chromium*	What is the basis for choosing to adjust only these, and by what range? Selecting the range is always subjective and uncertain.	The parameters listed in this section were not the only ones adjusted in the sensitivity analysis; these were only listed here as examples. All of			The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling	PG&E's response has been revised to reflect discussions between PG&E and TRC (Bob Prucha).	90% BOD Apdx B Section 6.3

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	78 Cocopah-78 CRIT-78		*partition coefficient, manganese Freundlich constants, arsenic precipitation rate, manganese liberation rate, and arsenic liberation rate, a reasonable qualitative and quantitative fit to the observed data and flow conditions was obtained. In addition to varying the parameters for the constituents of concern, additional analyses were conducted to evaluate additional parameter impacts on the solute transport model. These parameters include the TOC injection concentration, the riverbank extraction well rate, and the NTH IRZ well spacing. The solute transport modeling sensitivity analysis is presented in Section 10.*		the parameters describing the generation/ attenuation of solutes included in the solute transport model (including TOC, Cr[VI], manganese, and arsenic) were included in the sensitivity analysis, and, therefore, this aspect of the sensitivity analysis is comprehensive. It is agreed that there is a degree of subjectivity and uncertainty associated with selecting sensitivity ranges. A more detailed discussion of the parameters adjusted and justification of the ranges will be presented in Section 10. For clarity, the text in Section 6.3 will be modified to include all adjusted parameters in the 90% Design Submittal. Specifically, the following text will replace the second and third paragraphs of Section 6.3: "Each of the solute transport parameters affecting the transport and dynamics of dissolved solutes was adjusted in the sensitivity analysis, including the chromium partition coefficient, manganese Freundlich constants, arsenic precipitation rate, manganese and arsenic liberation rates, TOC half-life, and TOC-based chromium precipitation trigger. Each of these parameters was adjusted within a range encompassing anticipated values. For some parameters, the ranges were informed by a geochemical assessment of how site-specific variations in water quality affect the parameter of interest (see the geochemical sensitivity analysis described in Section 9.2), while for other parameters, sensitivity ranges were harder to constrain. In these cases, the ranges were chosen to be sufficiently wide (from at least +/- 50% to over an order of magnitude in some cases) to more than encompass any reasonably-anticipated values, given that the values chosen are site-specific and based on pilot test observations. Parameter ranges and results are described in more detail in Section 10. In addition to solute transport parameters, engineering design			issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	

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					parameters were also adjusted in the sensitivity analysis to evaluate potential design modification scenarios. Adjusted parameters included the TOC injection concentration, extraction rate at riverbank extraction wells, NTH IRZ well spacing, off-cycle NTH IRZ extraction, total NTH IRZ injection/extraction rates, freshwater injection rates, TOC injection in the IRL, and addition of intermediate recirculation wells. As with the solute transport parameters, parameter ranges were chosen to fully encompass reasonably-anticipated possibilities under a broad range of scenarios. Although numerous scenarios were considered in this analysis, additional design modification scenarios not considered here may become evident as the remedy proceeds. The results of these analyses are presented in Section 10." An additional paragraph will be added to list the parameters that were not adjusted during this solute transport model sensitivity analysis.					
383a	FMIT-93	Append B Section 6.4 p. 38	*Potential well locations were carefully selected by first avoiding culturally or otherwise sensitive areas to minimize impact…*	Given the many apparent design constraints identified throughout the document, it is strongly suggested that a full list be presented, showing how each is weighted in the effort to ”optimize” the remedial system (i.e., well locations, extraction/injection rates, on/off durations, etc.). It would be helpful for the Tribe to review this list prior to the 90 % BOD being issued.	Well locations, well spacing, and well rates were all considered in the remedial design to address the three major constraints (minimize remedial timeframe, minimize infrastructure to avoid culturally sensitive areas, and minimize byproduct generation). A full list/matrix of design considerations will be provided in the 90% design.			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Apdx B Table 6.4-1
383b	Hualapai-79 Chemehuevi-79 Cocopah-79 CRIT-79	Append B Section 6.4 p. 38	*Potential well locations were carefully selected by first avoiding culturally or otherwise sensitive areas to minimize impact…*	This is another design constraint. Given the many apparent design constraints identified throughout the document, it is strongly suggested that a full list be presented showing how each is weighted in the effort to “optimize” the remedial system (i.e., well locations, extraction/injection rates, on/off durations, etc.)	See response to comment #383a FMIT-93.			Comment resolved pending review of 90% design.	Comment resolved.	90% BOD Apdx B Table 6.4-1
384a	FMIT-94	Append B Section 11.0p. 73	*Note that density dependent flows (resulting from potential*	Investigation/Remedial Investigation (RFI/RI), PG&E Topock Compressor Station, Needles,California Volume 2 - Hydrogeologic Characterization and Results of Groundwaterand Surface	See comment 357a FMIT-67. In addition, the journal reference cited in the comment (Ward, et. al, 2008. *Variable density modeling of*			The FMIT transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7, 2014. The	PG&E’s response has been revised to reflect discussions between PG&E and TRC (Bob Prucha).	90% BOD Apdx B Section 11

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			deviations intemperature and salinity) were not simulated because these will have a negligible impact onsystem flows and the remedy design when compared to the natural heterogeneity of the aquifer.	Water Investigation, Feb 11, 2009, pages 6-33 to 6-37) This evaluation ONLY considered effects of density on plumemovement, not on effectiveness, efficiency or potential problems with the remediationsystem. Page 107 to 108 in Groundwater Modeling in Arid and Semi-Arid Areas edited by Howard S. Wheater, Simon A. Mathias, Xin Li discusses density effects on injection for ASR.The report should present an analysis supporting dismissal of density/temperature effects.What are the temperature effects on piped in freshwater injected over entire screened zone/aquifer? (see Revised Final RCRA Facility See also http://www.deepdyve.com/lp/elsevier/variable- density-modelling-of-multiple-cycle-aquifer- storage-and-NSsvy8c4T2 for variable density effects on cyclic ASR effects of heterogeneity and anisotropy (vert:horz). Review of 2009 CH2M HILL report suggests complex lateral heterogeneities and variable vertical anisotropy complicate this picture but WERE NOT considered in evaluating density effects on remediation system simulations. Available literature (and FEFLOW) suggest this should be considered, even if it is conceptual. This alone could cause considerable variation in predicted flow, transport, and geochemical predictions.	*multiple cycle aquifer storage and recovery (ASR): Importance of anisotropy and layered heterogeneity in brackish aquifers*) supports the conclusion that advective flow will likely be dominant over density driven flow in the vicinity of the Topock freshwater injection wells in most instances, though it is still possible. The paper presents a formula for calculating the Mixed Convection Ratio, M $\left(M = \frac{2\pi rB}{Q} Kv \left(\frac{\rho - \rho 0}{\rho 0}\right)\right)$. When M is much less than one, advective flow is dominant. When M is greater than 1, density driven flow has more influence. The value of M varies with distance from the well and several other parameters. Using the formula provided in the paper, the mixed convection ratio M was calculated for the two freshwater wells, FW-1 and FW-2. For this calculation, it was assumed that the water temperature was 85 degrees F and that the TDS of the injected freshwater would be 450 mg/L. The nominal injection rates from the 60% design were 100 gpm at FW-1 and 50 gpm at FW-2. The TDS of the water in the aquifer at the injection wells was estimated based on highest TDS values from nearby deep zone wells. The values of M calculated at the distance of the next nearest injection well to the freshwater well in question. The parameters used in the calculations are shown in the tables included in **Attachment I**, at the end of this table. For both FW-1 and FW-2, M is less than 1 out to the radius of the nearest other injection well, indicating that advective flow will dominate over density driven flow within this radius. At greater distances from the freshwater wells, density-driven flow starts to have more influence in the deep aquifer, but at these greater radii the flow will be influenced more by the IRL wells than by the freshwater wells. Density difference is one of several factors that could adversely affect the flushing efficiency in some areas of the site. Low permeability zones and preferential groundwater flow			letter is included in **Attachment S** at the end of this table.	On April 7, 2014, the FMIT transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	

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					paths are other factors. It is anticipated that there will be areas where flushing occurs faster than projected, and other areas where it occurs slower than projected. After several years of operations, areas where flushing efficiency is lacking will start to become apparent. One of the reasons for designing injection and extraction wells with excess capacity above the design flows is to have flexibility to adjust pumping and injection rates to optimize flushing of the plume to the IRZ. If density-driven flow impacts are observed to occur during remedy implementation (i.e. slower flushing of deeper, more saline portions of the aquifer in areas some distance away from the injection wells), steps can be taken to help mitigate these impacts. Potential steps include varying well flow rates or packering off sections of the screened intervals to manage density effects. The 90% design will include a section describing how density effects could be mitigated, should they occur.					
384b	Hualapai-80 Chemehuevi-80 Cocopah-80 CRIT-80	Append B Section 11.0p. 73	*Note that density dependent flows (resulting from potential deviations intemperature and salinity) were not simulated because these will have a negligible impact onsystem flows and the remedy design when compared to the natural heterogeneity of the aquifer.*	The report should present an analysis supporting dismissal of density/temperature effects. What are the temperature effects on piped in freshwater injected over entire screened zone/aquifer? (see Revised Final RCRA Facility Investigation/Remedial Investigation (RFI/RI), PG&E Topock Compressor Station, Needles, California Volume 2 - Hydrogeologic Characterization and Results of Groundwater and Surface Water Investigation, Feb 11, 2009, pages 6-33 to 6-37) This evaluation ONLY considered effects of density on plume movement, NOT on effectiveness, efficiency or potential problems with the remediation system. Page 107 to 108 in Groundwater Modeling in Arid and Semi-Arid Areas edited by Howard S. Wheater, Simon A. Mathias, Xin Li – discusses density effects on injection for ASR. See also: http://www.deepdyve.com/lp/elsevier/variable-density-modelling-of-	See response to comment #384a FMIT-94.			The Cocopah Indian Tribe transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 9, 2014. The letter is included in **Attachment S** at the end of this table.	See comment #384a FMIT-94. On April 9, 2014, the Cocopah Indian Tribe transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 11

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				multiple-cycle-aquifer-storage-and-NSsvy8c4T2 for variable density effects on cyclic ASR - effects of heterogeneity and anisotropy (vert:horz). Review of 2009 CH2M HILL report suggests complex lateral heterogeneities and variable vertical anisotropy complicate this picture but WERE NOT considered in evaluating density effects on remediation system simulations. Available literature (and FEFLOW) suggest this should be considered - even if it is conceptual. This alone could cause considerable variation in predicted flow, transport and geochemical predictions.						
385	FMIT-95 Hualapai-81 Chemehuevi-81 Cocopah-81 CRIT-81	Text is from “Groundwater Model UpdateReport, July 2005”,page 2-8	*The model requires three parameters for each river node: water surface elevation, riverbed elevation, and riverbed resistance (the inverse of permeability). Riversurface elevations were assigned throughout the model domain using average elevation of themain Topock site measuring point (I-3) and historical average river gradients between I-3 and the USGS gauging station in Topock Gorge, between I-3 and the RRB station at theupstream end of the site, and average gradient north*	What are effects of these assumptions (or associated uncertainty), especially the ”riverbed resistance”, on remedial system performance?Were these ever tested? The resistance as calculated here does not seem to correlate well with the thickness of the rind. Does it need to?	The simulated water surface elevation was based on average site measuring point data and historical average gradients and is therefore directly correlated with observed river stages. The riverbed elevation is an approximate representation of the river profile and would not have a significant impact on the remedial system performance as it remains in model layer 1. Riverbed resistance was evaluated during the calibration of the groundwater flow model and through the implementation of PEST it was observed that riverbed resistance was a relatively insensitive parameter. Riverbed resistance is dependent on the riverbed thickness and the model layer structure. By contrast, the rind is defined by geochemical properties, specifically reducing conditions prevalent in shallow-medium depth groundwater wells surrounding the river and the porewater of the river itself and the rind extends beyond the riverbed into the floodplain. Therefore the riverbed resistance does not necessarily correlate with the rind. The effects of changing riverbed conductance on the projected performance of the river bank wells has not been tested in the model. It should be noted that the river bank wells are not intended to be screened in the shallow zone, so they won’t be drawing water directly from the area immediately adjacent to and below the river. The amount of			The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	PG&E’s response has been revised to reflect discussions between PG&E and TRC (Bob Prucha). On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 12

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			of the site from USGS maps. The riverbed elevation wascalculated by assuming a triangular bed profile with a maximum depth of 20 feet decreasing to zero at the banks. Riverbed resistance is defined as the sum of:(1) riverbed thicknessdivided by its vertical hydraulic conductivity and (2) half of Layer 1 thickness divided by its vertical hydraulic conductivity.		water the wells draw from the river will be affected by both the river bed conductance and the Kh/Kv ratio of the sediments between the well screen depth and the river bottom, and Kh/Kv ratios surrounding the wells. Additional data to evaluate these parameters will be generated as the river bank extraction wells are installed and tested. The model will be updated, re-calibrated if necessary, and new long-term predictions made as these new data become available. A section will be added to the 90% BOD report to describe model update procedures.					
386	FMIT-96 Hualapai-82 Chemehuevi-82 Cocopah-82 CRIT-82	Section 3.1.4 p. 3-3	*Numerous iterations of the remedial system layout and operational strategy were then considered and simulated in order to arrive at an optimized remedial approach and to account for uncertainties in the model predictions.*	The document should present a summary of layouts and operational strategies and how were these used to 'optimize' the remedial approach. How were these used to account for uncertainties in model predictions specifically?	Considerable flexibility was incorporated into the remedial design by including provisional well locations and ranges in well rates in order to account for uncertainties in the model predictions. A table of optimization criteria will be developed reflecting the remedial design specifications and parameters encountered during well installation and operation.			Comment resolved pending review of 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.1.4
387	FMIT-97 Hualapai-83 Chemehuevi-83 Cocopah-83 CRIT-83	Section 3.1.4 p. 3-3	*Parameters that were adjusted between model runs included well locations, well extraction or injection rates, well*	It would be better to not confuse model "parameters" (i.e., hydraulic conductivity, storage, riverbed conductance etc.) with model boundary conditions (i.e., well extraction/injection rates, cycling of wells etc.). It appears most of these are the latter.	The text will be modified to better differentiate between model parameters and model boundary conditions. The revised text is as follows "~~Parameters~~ Boundary conditions that were adjusted between model runs included well locations, well extraction or injection rates, well cycling patterns (i.e.,			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Section 3.1.4

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			cycling patterns (i.e., duration of active operation versus shutdown), carbon substrate amendment injection concentrations, and reinjection destinations…		duration of active operation versus shutdown), ~~carbon substrate amendment injection concentrations,~~ and reinjection destinations. <u>Solute transport model parameters were also adjusted including carbon amendment injection concentrations, carbon decay rates, Cr(VI) partition coefficient, manganese generation/ attenuation rates, and arsenic generation/ attenuation rates."</u> <u>Relative sensitivities of each of the parameters/ conditions evaluated with the model will be tabulated to further illustrate the results of the sensitivity analyses and will be included in the 90% design submittal.</u>					
388a	FMIT-98	Section 3.1.4p. 3-3	• *Reduce the anticipated remedial time frame for effective capture and treatment of the Cr(VI) plume;* • *Minimize the necessary remediation infrastructure (i.e., total number of new well locations) or "footprint" of the remedial system; and* • *Minimize the impact of potential byproducts (i.e., arsenic and manganese.)*	After reviewing the document, it appears these are only three of other important optimization criteria. It is highly recommended that all of these be compare within a table where their relative priorities (importance) can be shown in deriving the final "layout" and "operational strategy" for the remedial system. What are the specific "performance metrics" for optimization? For example, what does the model suggest is the optimum time to reduce the plume volume (or Cavg for Cr(VI)) to some small remaining percentage of existing mass? Were the optimization (or sensitivity) runs designed to only qualitatively determine things like well locations, rates, cycling etc? It does not seem very quantitative. Is this because the overall modeling objectives are somewhat vague? Review of Appendix B - does not show a very clear optimization strategy. In fact, it appears to be confused with a limited sensitivity analysis that only assesses remedial design performance by adjusting remediation system-specific boundary conditions individually (and not in combination). It would be more useful to conduct a sensitivity analysis to evaluate remedial system performance due to the combined effects of remediation system BCs with uncertain model parameters, or model BC unrelated to	These are still the three core criteria for the remedial design. All three are directly related and need to be balanced during remedy design and implementation A table of optimization criteria will be developed reflecting the remedial design and operation specifications and parameters encountered during well installation and operation. Performance metrics will be developed as part of this table. A subset of possible boundary conditions and solute transport model parameters were varied individually to assess their direct impact on the simulation results. Relative impacts of individual parameters could be masked by simulating combinations of flow and solute transport parameters (and boundary conditions). Conclusions can still be drawn on combined impacts based on sensitivity simulation results where only individual parameter/boundary conditions are adjusted. The relative sensitivities of adjusted inputs will be summarized in a sensitivity table to better illustrate the degree of sensitivity, in addition to presenting the simulated solute transport modeling results at 10 and 30 years for Cr(VI), TOC, Mn, and As. The adjusted inputs will be arranged by type (i.e, flow parameter, transport parameter, boundary condition,			The FMIT transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7, 2014. The letter is included in **Attachment S** at the end of this table.	PG&E's response has been revised to reflect discussions between PG&E and TRC (Bob Prucha). On April 7, 2014, the FMIT transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.1.4 90% BOD Apdx B Sections 6.6 and 10

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				the remediation system (i.e., recharge, ET, lateral inflows). This would have been useful towards evaluating effects of model parameter uncertainty on predictions, though other sources of uncertainty would have to also be considered as well for a complete picture (i.e., conceptual and model input uncertainty).	operational factor etc) for clarity.					
388b	Hualapai-84 Chemehuevi-84 Cocopah-84 CRIT-84	Section 3.1.4p. 3-3	• *Reduce the anticipated remedial time frame for effective capture and treatment of the Cr(VI) plume;* • *Minimize the necessary remediation infrastructure (i.e., total number of new well locations) or "footprint" of the remedial system; and* • *Minimize the impact of potential byproducts (i.e., arsenic and manganese.)*	After reviewing the document, it appears these are only three of other important optimization criteria. It is highly recommend that all of these be compiled within a table where their relative priorities (importance) can be shown in deriving the final "layout" and "operational strategy"' for the remedial system. What are the specific "performance metrics" for optimization? For example, what does the model suggest is the optimum time to reduce the plume volume (or Cavg for CrVI) to some small remaining % of existing mass? Were the optimization (or sensitivity) runs designed to only qualitatively determine things like well locations, rates, cycling etc.? It does not seem very quantitative. Is this because the overall modeling objectives are somewhat vague? Review of Appendix B does not show a very clear optimization strategy. In fact, it appears to be confused with a limited sensitivity analysis that only assesses remedial design performance by adjusting Remediation System-specific Boundary Conditions (BCs) individually (and not in combination). It would be more useful to conduct a sensitivity analysis to evaluate remedial system performance due to the combined effects of remediation system BCs with uncertain model parameters, or model BCs unrelated to the remediation system (i.e. recharge, ET, lateral inflows). This actually would have been useful towards evaluating effects of model parameter uncertainty on predictions, though other sources of uncertainty would have to also be considered as well for a complete	See response to comment #388a FMIT-98.			The Cocopah Indian Tribe transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7, 2014. The letter is included in **Attachment S** at the end of this table.	See comment #388a FMIT-98. On April 9, 2014, the Cocopah Indian Tribe transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Section 3.1.4 90% BOD Apdx B Sections 6.6 and 10

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				picture (i.e., conceptual and model input uncertainty.)						
389	FMIT-99 Hualapai-85 Chemehuevi-85 Cocopah-85 CRIT-85	Section 3.2 p. 3-4	*….represent a level of detail appropriate for the 60 percent design phase…*	What is "appropriate"? As opposed to the 30% or 90%?	"Appropriate" level of detail for the 60% is a near final design to provide a clear approximation of the remedy performance.			Comment resolved.	Comment resolved.	Not applicable
390	FMIT-100 Hualapai-86 Chemehuevi-86 Cocopah-86 CRIT-86	Section 3.2.1.1 p. 3-7	*….at the 16 NTH IRZ Injection Well locations/clusters resulted in effective remediation (i.e., produced an adequate reducing zone while limiting byproduct formation)…*	Can this be defined more clearly/accurately - it seems important as a remediation system performance target. But stating that it "produced an adequate reducing zone while limiting byproduct formation" is vague. The model results are quantitative, though uncertain, and should be used as such to evaluate overall performance.	The text will be modified as follows (added text shown in underline typeface and deleted text shown in ~~strikethrough~~ typeface): "...the 16 NTH IRZ Injection Well locations/clusters resulted in effective remediation (i.e., ~~produced an adequate reducing zone~~ some of the Cr[VI] simulations indicated that Cr[VI] treatment through the NTH IRZ was complete without breakthrough, while predicted byproduct generation, migration, and attenuation were limited to levels consistent with the current conditions of the reducing rind ~~limiting byproduct formation~~)...".			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Section 3.2.1
391	FMIT-101 Hualapai-87 Chemehuevi-87 Cocopah-87 CRIT-87	Append B Section 1.2p. 1	*The objectives of this modeling study were to develop a groundwater flow and solute transport model for useas follows:* • *Evaluate subsurface flow conditions* • *Evaluate the fate and transport of Cr(VI)* • *evaluate fate and Transport of manganese and arsenic* • *Evaluate potential remedial system*	These objectives seem inconsistent with those conveyed in the project RAOs. For example, isn't the key objective of the modeling to develop aremedial design layout and operation that meet RAOs? Why aren't objectives of the RAOs stated here as key guides to how the model was developed and applied towards developing the design and operation of the remedial system? As written here, the modeling appears to be used only to "evaluate" conditions. The subsequent text clearly indicates the modeling tool(s) are used to support many critical steps of the proposed design/operation, for example: well locations, pumping rates, TOC injection rates, cycling of injection/extraction etc). As such, shouldn't the objectives been restated to better convey how the modeling tool(s) are used here and how they will be used in the future? Objectives are crucial to defining the purpose and approach for the modeling and should be clearly	The objectives of the groundwater flow and transport model will be refined to more clearly reflect the RAOs. The process used and the role of the model in the design will be more clearly described in the 90% design document.			Comment resolved pending review of the 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 1.2

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			configurations	established.						
392	FMIT-102 Hualapai-88 Chemehuevi-88 Cocopah-88 CRIT-88	Append B Section 1.2 p. 1	This appendix describes the results of six major components of the modeling study at the Site:	The flow, solute transport and fate associated with the natural and remedial operation flow systems is complex. The conceptual and numerical modeling of these processes is equally complex. It is standard practice to include flow charts of showing how previous regional modeling fit in with local-scale models, how the flow model feeds into the transport and the geochemical models, and then how sensitivity and uncertainty analyses/ model validation are conducted. This is recommended to help technical reviewers convey these concepts to other less technical people. It will also be useful for conveying how future updates would be conducted (i.e., what aspects of modeling). Much of the fate/transport modeling for example, depends on flow modeling. Ultimately the modeling should support complex decisions.	A flow chart will be developed and included in the 90% design submittal to show the relationship of the regional groundwater flow model, the geochemical model, and the solute transport model, and the associated uncertainties and sensitivities.			Comment resolved pending review of the 90% design documents. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 1.2
393	FMIT-103 Hualapai-89 Chemehuevi-89 Cocopah-89 CRIT-89	Append B, Section 3.2 p. 12	*The reducing environment can be adjusted to minimize byproduct liberation without negatively impacting Cr(VI) reduction by properly controlling organic carbon dosing and distribution.*	This section should discuss the optimization strategy to minimize byproduct liberation?	The optimization strategy to minimize byproduct generation is to introduce the minimum amount of carbon necessary to establish sufficient reducing conditions for Cr(VI). This information will be added to the text.			Comment resolved pending review of 90% design. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 3.2
394	FMIT-104 Hualapai-90 Chemehuevi-90 Cocopah-90 CRIT-90	Append B Section 4.0p. 18	*The auto-calibrationprog ram PEST was employed to refine thecalibration and to reduce effects of uncertainty in each calibration target. The PEST programaddres ses*	How was this done specifically? Simple application of PEST does not assure validity of the distributions. In fact, the very complex hydraulic conductivity beneath the Colorado River seems unsupported by data and somewhat contrived. The concern is how this affects predicted aquifer response to the long- term remedial system operations. The sensitivity of these parameter distributions on model predictions should be evaluated.	Text will be modified as follows: "*The auto-calibration program PEST was employed to refine the calibration by minimizing the difference between observed and simulated calibration targets ~~and to reduce effects of uncertainty in each calibration target~~.*" Despite the lack of hydraulic data beneath the river, the simulated hydraulic conductivity (K) distributions minimizes the objective function(s) based on data that was available in the vicinity of the Colorado River. Hydrogeologic			The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	PG&E's response has been revised to reflect discussions between PG&E and TRC (Bob Prucha). On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 4

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			heterogeneity in the aquifer by establishing a variable hydraulic conductivitydistribution across the groundwater flow model domain during thecalibration process.		interpretation is important in simulating areas where limited data is available. Given that the simulated K value distribution agreed with the hydrogeologic interpretation and resulted in a well calibrated groundwater flow model, this is the best baseline to conduct the solute transport modeling. While varying the K distribution may impact the calibration and predictions, the baseline run would still be the ideal version to utilize minimizing the need for a detailed sensitivity analysis.					
395	FMIT-105 Hualapai-91 Chemehuevi-91 Cocopah-91 CRIT-91	Append B Section 4.4 p. 20	Boundary Conditions	Typically recharge and evapotranspiration are discussed in this section. In the CH2M HILL document titled "Groundwater Model Update Report, July 2005", Maximum ET rates appear to have been set at 0.42 in/yr. This seems exceptionally low for max ET rate. Statewide estimates in this area likely exceed this by at least 2 orders of magnitude. The implication of underestimating this rate is that under the non-stressed calibration conditions more groundwater likely discharges into the river nodes rather than ET nodes adjacent to the river. The problem with this is that during remedial system operation, when the system gets stressed beyond the "calibration state", the predicted dynamics and water balance associated with aquifer-river interactions and aquifer-ET interactions will be wrong. See http://www.twdb.texas.gov/publications/reports/contracted_reports/doc/2004483535_UT_BEG.pdf for published examples of annual maximum ET rates and a review of ET simulations in MODFLOW. Time-varying Cr data presented at the TWG meeting, July 18, 2013, showed annual cyclicity of shallow Cr concentrations. Is it the variation in ET rates that concentrates Cr during warmer months? If so, is this accounted for in the models? The calibration of the transient groundwater flow model (MICROFEM) appears to be based on varying river stage and ET rates based	During the calibration process, it was observed that evapotranspiration was not a sensitive parameter in the groundwater flow model. The MODFLOW/MT3D flow model utilized the average ET rate directly from the regional groundwater flow model and it was held constant to represent long-term steady state conditions. Because of the depth of the water table throughout most of the model domain, the ET rate is specified as zero at the extinction depth specified to be 10 feet. The active areas are predominantly in the flood plain and to the south near the bedrock where the aquifer pinches out and are consistent with the narrow bands of observed vegetation. During remedy operation ET would likely remain the same or decrease due to hydraulic stresses in the floodplain. From a volumetric approach, implications for an ET value that is too low would mean that more water would discharge to the river to achieve flow balance in the system. This may require increased flows at river bank extraction wells than anticipated. During installation/testing and model updates, this will be further evaluated to see if the ET module parameters in the groundwater flow model need to also be updated under this new state of stress.				The comment was resolved verbally at the February 12, 2014 CWG. Comment resolved.	Not applicable

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				on the Consumptive Use Program 2005 data - but it is unclear how 0.42 in/yr was scaled to match this data. What did the long-term transient MODFLOW/ MT3D flow and fate/transport simulations with the new remedial system design and operation presented here assume for maximum ET rate and its variation in time? What are implications if it is too low?						
396a	FMIT-106	Append B Section 5.1p. 21	Geochemical and Reactive Transport Code Selection *Batch simulations were performed with the geochemical modeling software PHREEQC…"*	How sensitive are the PHREEQC geochemical reactions to seasonal variations in injected water temperatures? Would external air temperature variations affect above the extracted groundwater temperatures associated with piping from the freshwater source?	All of the geochemical reactions considered are sensitive to temperature to a minor extent. The average temperature of groundwater at the Site is approximately 25°C, which is the temperature at which the geochemical calculations were run. While water temperatures are expected to change slightly during travel through the pipelines and tanks, the temperature changes will be readily buffered as the water is injected back into the aquifer so that the actual temperature change within the aquifer will be so small that the effects on geochemical reaction rates and equilibria will be negligible. Any variations in solute transport parameters as a result of temperature fluctuation are well-bracketed by the sensitivity parameter ranges already considered in Section 10. With respect to the freshwater injection, modeling will be updated in the 90% design to account for differences in temperature between the source water and the injection sites.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Apdx B Sections 5.2 and 5.4.3
396b	Hualapai-92 Chemehuevi-92 Cocopah-92 CRIT-92	Append B Section 5.1p. 21	Geochemical and Reactive Transport Code Selection *Batch simulations were performed with the geochemical modeling software PHREEQC…"*	How sensitive are the PHREEQC geochemical reactions to seasonal variations in injected water temperatures? Would external air temperature variations affect the extracted groundwater temperatures associated with piping from the freshwater source?	See response to comment #396a FMIT-106.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Apdx B Sections 5.2 and 5.4.3
397	FMIT-107	Append B	*In addition to*	These are not really model	The text will be edited from			Comment resolved pending	Comment resolved.	90% BOD Apdx B Section 6.3

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	Hualapai-93 Chemehuevi-93 Cocopah-93 CRIT-93	Section 6.3 p. 37	*varying the parameters for the constituents of concern, additional analyses were conducted to evaluate additional parameter impacts on the solute transport model. These parameters include the TOC injection concentration, the riverbank extraction well rate, and the NTH IRZ well spacing. The solute transport modeling sensitivity analysis is presented in Section 10.*	"parameters" but rather remedial system factors associated with external boundary conditions imposed on the flow system. Mixing model parameters that affect flow, fate/transport, geochemical reactions with those associated with the design/operation of the remedial system is confusing. During start-up, model testing/verification, it will become essential to distinguish between the many inputs to the model(s) to understand the reason(s) why any deviations between what has been predicted by the model(s) and what is observed under the new system stresses so that the proper adjustments can be made to improve overall performance (i.e., reducing Cr at the fastest rate possible).	"parameter impacts" to "remedial system design" for clarification. Geochemical parameters / solute transport parameters / hydrogeologic parameters / remedial system layout and operation will all be considered while comparing the performance of the remedial design in relation to the simulated results.			review of the 90% design.		
398	FMIT-108 Hualapai-94 Chemehuevi-94 Cocopah-94 CRIT-94	Append B Section 6.4 p. 37	Remediation Design	What are performance metrics developed for the design and operation? These should have been developed at key locations/areas to allow quantitative comparisons between sensitivity runs that appear to be used to assess different adjustments to the well locations and operations? Many results of the sensitivity runs are evaluated "qualitatively", so it is difficult to assess true performance at key areas.	Relative sensitivities of each of the parameters/conditions evaluated related to Cr(VI) reduction, Mn generation/attenuation, and As generation/ attenuation will be tabulated to further illustrate the results of the sensitivity analyses and will be included in the 90% design submittal. Exact performance metrics were not generated for specific locations, but rather the spatial distribution of TOC, Cr(VI), Mn, and As were used to develop the remedial system design and operation. In addition, a table of optimization criteria will be developed reflecting the remedial design specifications and parameters encountered during well installation and operation.			Comment resolved pending review of the 90% design documents. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	Comment resolved. On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Tables 10.1 and 6.4-1

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399	FMIT-109 Hualapai-95 Chemehuevi-95 Cocopah-95 CRIT-95	Append B Section 8.1.2 p. 51	Geochemical Model Parameters	This may have been presented in previous reports, but it is difficult to understand these complex flow, transport and chemical reactions without a conceptual diagram that shows fundamental components and processes that are then modeled.	An illustrative conceptual diagram highlighting all of the major geochemical processes considered in evaluating the remedy will be prepared for the 90% Design Submittal. This conceptual diagram will primarily serve to illustrate the processes outlined in Section 5.2, which includes all of the reactions considered in the geochemical and reactive transport modeling.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Apdx B Section 2.4
400	FMIT-110 Hualapai-96 Chemehuevi-96 Cocopah-96 CRIT-96	Append B Section 8.2 p. 53	*Incremental manganesecon centration increases in the river werecalculated based on the average river flow rate past the Site, estimated at 6.8 million gpm (CH2M HILL 2011). Based on model estimated river interface concentrations and thecalculated river dilution factors, the incrementalcon centration increase isless than 2.5 ng/L (less than 0.0025 µg/L) underall scenarios modeled,down from between 6 and 60 ng/L without oxidation. It is, therefore, predicted that any increase in Mn(II) concentration in the river will be orders of magnitude below detection,*	Isn't this also true for Cr and As? Does this address the RAO regarding prevention of impacts on the Colorado River water?	The simulated results indicate that Cr(VI) is reduced and hydraulically captured and will not impact the Colorado River. Similarly, simulated byproduct arsenic generation in the floodplain remains below 5 ppb and will not impact the Colorado River. This addresses the RAO regarding the prevention of impacts to the Colorado River.			Comment resolved.	Comment resolved.	90% BOD Apdx B Section 8.2

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			particularly after oxidation within the hyporheic zone.							
401	FMIT-111 Hualapai-97 Chemehuevi-97 Cocopah-97 CRIT-97	Append B Section 9.2 p. 58	*The sensitivity range considered in the solute transport model sensitivity analysis, therefore, adequately accounts for uncertainty and variability in groundwater chemistry, as well as additional uncertainty/ variability in sorption site concentration.*	All model parameters, boundary condition assumptions, and conceptualization uncertainties need to be assessed along with uncertainties in groundwater chemistry.	Uncertainty is inherent in any mathematical representation of a natural system. It is acknowledged in the groundwater flow and solute transport models that a more detailed uncertainty analysis would confirm this uncertainty. The proposed design and range of operation were based on the calibrated groundwater flow model, the predictive solute transport modeling and sensitivity analysis, available characterizations, and professional judgment.			The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	PG&E's response has been revised to reflect discussions between PG&E and TRC (Bob Prucha). On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 11
402	FMIT-112 Hualapai-98 Chemehuevi-98 Cocopah-98 CRIT-98	Append B Section 10.0 p. 59	Solute Transport Model Sensitivity Analysis	The sensitivity of model transport results performed here does not consider effects of the many complex flow parameter/boundaryconditions. Can the same conclusions about adjustments to design/operation factors (i.e., well spacing, TOC injection concentrations, etc.) be made given the uncertainties associated withflows? Is it always possible to conclude the design is conservative and operations can always be 'tweaked' to meet objectives? If multiple factors/parameters/boundary conditions had been adjusted within reasonable ranges simultaneously, rather than individually, would the conclusions be the same? There are many parameters and factors influencing the overall remedial system performance. Because the modeling tools are the primary tools used to define the design and operation of the system, it is recommended that all flow, transport, and geochemical parameters and boundary conditions, and all design and operation factors	The groundwater flow model utilized to conduct the solute transport modeling represents a reasonable calibration to the available data. It is admittedly not the only possible combination of parameters that could result in an acceptable calibration. The uncertainty in model predictions is accounted for by providing flexibility in the design flow rates and well locations. This design flexibility is based on the solute transport modeling and sensitivity analysis, professional experience, and the hydrogeologic characterization of the site. Adjustment to groundwater flow model parameters will change flows through hydrogeologic units differently, but adjusting individual remedial design injection/extraction well flow rates within stated ranges is expected to allow the system to meet stated objectives. A section will be added to the 90% BOD report to describe model update procedures.			Suggest it is better to use a range of calibrated model inputs (flow) and transport inputs (possible range) to simulate a range of possible outcomes. The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	PG&E's response has been revised to reflect discussions between PG&E and TRC (Bob Prucha). On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 12

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				be compiled and kept separate. Given the complexities of the flow/transport system, when initial observed system performance starts to deviate from what was simulated, knowing which parameters, or factors to adjust will be essential. The impression here is that they are not distinguished, nor fully tested. It is difficult to see how the model(s) won't be required to be updated frequently, at least early on, especially with any adjustments to the design or operation. Every adjustment would require long-term projections to make sure that none of the modeling objectives (or metrics) are problematic. This doesn't seem possible using just field observations.						
403a	FMIT-113	Append B Section 10.13 p. 71	Intermediate Recirculation Well Sensitivity *In order to optimize the performance of the remedial design….*	How many simulations were conducted and what were the performance metrics, or optimization criteria/targets?	Numerous simulations were conducted with changes in well locations, well rates, well operations, and TOC concentrations. The optimization criteria were to accelerate the remedial timeframe while preventing Cr(VI) migration past the NTH IRZ, hydraulically capturing the existing floodplain Cr(VI) impacts, and minimizing byproduct generation. A table of optimization criteria will be developed reflecting the remedial design specifications and parameters encountered during well installation and operation. Performance metrics will be developed as part of this table.			Comment resolved pending review of 90% design. The FMIT transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7, 2014. The letter is included in **Attachment S** at the end of this table.	Comment resolved. On April 7, 2014, the FMIT transmitted letters regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 10.13
403b	Hualapai-99 Chemehuevi-99 Cocopah-99 CRIT-99	Append B Section 10.13 p. 71	Intermediate Recirculation Well Sensitivity *In order to optimize the performance of the remedial design….*	Is it really optimized? How many simulations were conducted and what were the performance metrics, or optimization criteria/targets?	See response to comment #403a FMIT-113.			Comment resolved pending review of 90% design. The Cocopah Indian Tribe transmitted a letter to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7, 2014. The letter is included in **Attachment S** at the end of this table.	Comment resolved. On April 9, 2014, the Cocopah Indian Tribe transmitted a letter regarding comments on modeling issues. PG&E will work with the Tribe and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 10.13
404	FMIT-114 Hualapai-100 Chemehuevi-100 Cocopah-100 CRIT-100	Append B Section 11.0p. 73	*As with all mathematical models of natural systems, the groundwater flow and solute*	There is a lack of discussion on anisotropy within the remediation zone. K values are shown on plots, but nothing on Kv distribution. What effect does the increased uncertainty in model input parameters (outside of the localized	Horizontal to vertical K (Kh/Kv) ratios are discussed in the Groundwater Model Update Report (CH2M HILL, 2005) and the final calibrated distribution is utilized in the MODFLOW model / solute transport model.			Predictive uncertainty can be assessed, even if it means looking at the extremes of key parameter ranges.	The comment was resolved verbally at the February 12, 2014 CWG. Comment resolved.	Not applicable

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			transport model is limited by factors, such as scale, accuracy of the estimated hydraulic properties and/or boundary conditions, and the underlying simplifications and assumptions incorporated into the model. These factors result in limitations to the model's appropriate uses and to the interpretations that may be made of the simulation results."	remedial system area where there is anabundance of data) have on the remedial system performance towards achieving model objectives or RAOs? A key outcome of the uncertainty analysis for the Tribes is an estimate of how long it will take for the system to operate. Can it be less than 30 years, or could it be greater than 50? It would have been useful if the uncertainty analysis here considered all parameter/boundary condition uncertainties in addition to "sensitivities" of various remedial design or operation factors. Figures D4-1 through D4-8 in the Jan 2009 CH2M HILL Report titled "Corrective Measures Study/Feasibility Study Report for Chromium in Groundwater" nicely show a range of uncertainty for cleanup times vs. amount, but these aren't to be applied to the current design or operation.	See response to comment 401 FMIT-111.					
405	FMIT-115 Hualapai-101 Chemehuevi-101 Cocopah-101 CRIT-101	Append B Section 11.0 p. 73	*With respect to the solute transport model, uncertainty associated with subsurface heterogeneity was addressed by simulating the system as a dual-domain model….*	How was "uncertainty" with heterogeneity addressed by assuming a dual-domain model? Is this assumed to be the largest source of uncertainty in the solute model?	Text will be modified as follows: *A dual-domain mass-transfer approach was used to model solute transport in the heterogeneous aquifer system as the small-scale preferential flow pathways cannot be fully and explicitly represented by the spatial discretization in a numerical model for practical reasons.*			The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	PG&E's response has been revised to reflect discussions between PG&E and TRC (Bob Prucha). On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the resolution in the 90% design.	90% BOD Apdx B Section 11
406	FMIT-116 Hualapai-102 Chemehuevi-102 Cocopah-102 CRIT-102	Append B Section 11.0p. 73	*This sensitivity analysis can be utilized to address the uncertainty in the model by providing a range of remedial impacts and relative impacts of*	Concerns include: a) Uncertainty - parameter adjustments only partly contribute to overall prediction uncertainty. Conceptual uncertainty is typically the largest. There is no discussion on the latter, or on an actual uncertainty analysis vs. a sensitivity analysis. A sensitivity analysis should not be confused with an uncertainty analysis that	a) Uncertainty is inherent in any mathematical representation of a natural system. It is acknowledged in the groundwater flow and solute transport models, and a detailed uncertainty analysis would confirm such uncertainty. Typical Monte Carlo analyses require hundreds to thousands of runs to produce uncertainty plots. Given the size and complexity of the flow and solute transport model, this is not a			The FMIT and the Cocopah Indian Tribe transmitted letters to DTSC/DOI regarding comments on modeling issues related to the 60% BOD on April 7 and April 9, 2014, respectively. The letters are included in **Attachment S** at the end of this table.	PG&E's response has been revised to reflect discussions between PG&E and TRC (Bob Prucha). On April 7 and April 9, 2014, the FMIT and the Cocopah Indian Tribe transmitted letters regarding comments on modeling issues, respectively. PG&E will work with the Tribes and the TRC to resolve these comments and incorporate the	90% BOD Apdx B Table 10.1

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			byproducts.	simultaneously varies parameters an amount that preserves calibration and provides a probability associated with predictions. Typical methods are Monte Carlo, GLUE, Linear, etc.). See http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6805/cr6805.pdf b) Only a select number of parameters were evaluated in the sensitivity analysis. It is unclear whether those parameters adjusted in the analysis represent ones the system response is most sensitive to. A complete table showing which parameters were adjusted, by how much, the basis for the adjustments and quantifiable results is needed. c) Were model results from each sensitivity run evaluated to ensure that specified parameter adjustments still produced results within calibration? Calibration was performed against several datasets (page 18, p. 1, AppB) including short-term pumping tests and monthly water level response to river-levelfluctuations. Were these re-evaluated with parameter adjustments in the sensitivity analysis to ensure sensitivity results are still valid within the calibration solution space? d) It is unclear what basis is used for specification of parameter adjustment amounts. This can be very subjective and can lead to meaningless output if results lie outside of calibration target values. Can specific calibration target values/tolerance be provided? It is not uncommon to vary hydraulic conductivity by an order of magnitude (a factor of 10), but each parameter should only be adjusted by an amount commensurate with its likely range. e) Parameter adjustments appear to have been only varied individually vs. in combination. The concern here is that although the system	practical exercise. b) The parameters varied for the solute transport model represented the major parameters utilized in the solute transport model as well as the remedial components. The sensitivity analysis details were presented in Section 10 of Appendix B, but they will be tabulated and organized by type for clarity. c) The calibration was conducted for the groundwater flow model prior to the integration into the solute transport submodel. Subsequent sensitivity analyses conducted using the solute transport model involved ranges in solute transport parameters and remedial component operation. d) Parameter variation was described in Section 10 of Appendix B, but they can be tabulated for clarity. e) Solute transport model parameters were varied individually to assess their direct impact on the simulation results. Relative impacts of individual parameters could be masked by combining sensitivity				resolution in the 90% design.	

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				might have responded one way with one input adjustment (i.e., IRZ well location spacing), with an adjustment of another input such as injection/extraction well flow rates, or hydraulic conductivity values, results would likely be different.	runs. However, conclusions can still be drawn on combined impacts based on the individual sensitivity analyses.					
407	FMIT-117 Hualapai-103 Chemehuevi-103 Cocopah-103 CRIT-103	Append B Section 12.0p. 74	*During installation and implementation of the remedial design, the additional hydrogeologic and groundwater quality data can be utilized to update the groundwater flow and transport models to improve their effectiveness as evaluation tools.*	The details of how this will be done should be included. It is highly recommended that the flow model be updated and verified as new wells are completed and hydraulically tested. This way, it would be possible to revise any remaining well locations if needed.	See response to comment #653 DOI-268. There are several checkpoints during remedy implementation when the groundwater flow and solute transport model update will be evaluated, including during installation, after system start-up, and during remedy operation. During the installation phase the model will be updated, if the data collected during construction significantly contradict the current model construction. For example, if large variations in saturated aquifer thickness, bedrock extent, permeability, chromium distribution, etc. are measured compared to what has been modeled to date, the model would be updated and re-run. The regional model would be updated first, then imported into the fate and transport submodel before transport runs are conducted. During remedy well testing and system start-up, information will be gathered about achievable flow rates for the remedy wells and system as installed and actual hydraulic gradients. That information will be fed back into the model and additional predictions will be made. As remedy operation progresses, the observed data will be used to better calibrate the model and generate updated predictions of future performance. In particular if actual data collected contradicts geochemical or solute transport results, the model will be updated and predictive scenarios will be re-run. A section will be added to the 90% BOD report to describe model update procedures.				The comment was resolved verbally at the February 12, 2014 CWG. Comment resolved.	90% BOD Apdx B Section 12
Specific Comments – Appendix C (Design Criteria), Attachment C (Geotechnical Analysis) and Attachment E (Fire System Analyses)										

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408	FMIT-118	Appendix C		Section C.2.2 Earthwork: This section states that access roads with two way traffic must be at least 20 ft wide. Adding utility trenching of at least three feet and proper drainage to the required 20 feet increases the possibility of maze disturbance. Will design alternatives to minimize width including variances be sought?	All new access roads included in 60% design (e.g., for IRL-2/IRL-4 and the access road north of the Transwestern Bench) have been designed for the smaller, one-way traffic width. The larger two-way traffic width access road applies to new fire access road and was included in Appendix C for completeness. San Bernardino County Code Chapter 5 allows a variance for narrower fire access roads if turnouts [6 feet wide by 50 feet long] are provided about every 600 feet (County Standard 503.1). Language will be added to this section to recognize the county variance.			In general, FMIT wants to reduce infrastructure footprint and takes advantage of variances. Tribe would also like to walk the alignment around the time of 90% design.	Comment resolved.	90% BOD Appendix C Section C.2.2. Regarding Tribe's request to walk the alignment around the time of the 90% design, there were two scheduled walks at TCS – the first walk was held on June 19, 2014 (also a TWG meeting) to view remedy facility locations including wells, and the second walk was held on July 24, 2014.
409	DTSC-120	Appendix C, Section C.2.2, p.c-5, 1st bullet	If drilling fluids are used, continuous monitoring for frac-out conditions will be performed to prevent harm to human health and the environment caused by the release of such fluids.	Please list the potential type of drilling fluids to be used. Since there are concerns with health and safety from the release of such fluids, PG&E should cover this subject specifically in the site Health and Safety Plan and attached the MSDS for the fluids.	Potential type of drilling fluids will be listed in the Construction/Remedial Action Work Plan.	Okay pending review of the 90%.			Comment resolved.	Construction/Remedial Action Work Plan Section 3.2.1.1 and Exhibit 3.2-1
410	DTSC-121	Appendix C, Section C.2.3 Storm Drainage, p.c-6	List of erosion control measures	Will PG&E provide storm drainage control plan along with pre-final and final design so that the locations of such items as silt fences, sediment basins, and check dams be identified?	This information will be included as part of the Construction/Remedial Action Work Plan that will be part of the 90% submittal.	Okay.			Comment resolved.	Construction/Remedial Action Work Plan
411	DTSC-122	Appendix C, Section C.2.6, Construction in 100-year Floodplain	In this 60%, certain infrastructure (piping) cannot be located outside of the 100-year floodplain as defined by the above baseline flood elevation.	PG&E should provide a figure showing where these infrastructures are located and continue to report back to the agencies and stakeholder groups on the progress of discussion with Counties. DTSC requests that all variances from County standards be properly documented for administrative record.	Figure 2.4-5 shows the remedy project components that are located in the 100-year floodplain. PG&E will keep the stakeholders informed of discussion with the Counties and document any variance from Country requirements.	PG&E should document all variances being sought and its status throughout the design and construction process. Suggest tabulating the specific variance in the design document with on-going status.			Comment resolved.	Not applicable
412	DTSC-123	Appendix C, Section C.4, Geotechnical	It is important to note that PG&E continues to engage in discussions	PG&E should be mindful that any activities conducted for the purpose of the remedy must be in conformance of the final EIR evaluation. All intrusive activities undertaken for the purpose of the	PG&E appreciates the comment; we are fully aware of and have been complying with this requirement. We will continue to discuss with agencies and keep Tribes and stakeholders informed of all ground disturbance	Okay.			Comment resolved.	Not applicable

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			with transportation agencies, counties, and other property owners/land managers… additional geotechnical data may be required to meet specific requirements of agencies and/or property owners/land managers.	remedy must be discussed with agencies to determine approval process. Furthermore, such activities may be subject to requirements and/or compliance with the adopted mitigation measures for the project, including, but not limited to, stakeholder notification and Tribal monitoring.	activities for the purpose of the remedy, as required by the mitigation measures in the EIR.					
413	DTSC-124	Appendix C, Section C.5.1 piping	Designation of pipelines (e.g. pipeline A, Pipeline H)	Please include or reference a figure that shows the locations of the pipeline segments.	Drawing C-07-02 shows the pipeline segments and this will be called out in the text.	Okay.			Comment resolved.	90% BOD Appendix C Section C.5.1 referenced drawing C-07-01 (Pipeline Key Map)
414	DTSC-125	Appendix C, Section C.5.5.1		Three specific areas are identified in this section, Area 1, 2 and 3. However, there are no diagram or figure referenced to visually discern these areas. Please provide a reference figure of the areas.	A new exhibit showing these three areas will be added in the 90% BOD.	Comment resolved pending review of the new exhibit.			Comment resolved.	90% BOD Figure 3.5-1
415	DTSC-126	Appendix C, Section C.6.9	All existing utilities will be potholed for actual depth prior to construction following Compressor Station or utility owner methods and requirements	PG&E should be mindful that any activities conducted for the purpose of the remedy must be in conformance of the final EIR evaluation. All intrusive activities undertaken for the purpose of the remedy must be discussed with agencies to determine approval process. Furthermore, such activities may be subject to requirements and/or compliance with the adopted mitigation measures for the project, including, but not limited to, stakeholder notification and Tribal monitoring.	See response to comment #412 DTSC-123.	Response noted.			Comment resolved.	Not aplicable
416	DTSC-127	Appendix C, Section 9, PG&E Personnel Requirements		All personnel associated with the project should review and comply with the requirements of the project specific Health and Safety Plan to be submitted (as stated in Section C.10). Furthermore, PG&E must maintain Health and Safety Plan on site and accessible to all personnel engaged in this project.	Comment noted. The following text will be added to the last sentence of the second paragraph in Section C.10 to reflect this comment (inserted text shown in <u>underline</u> typeface): "These health and safety plans <u>will be available onsite and</u> will describe…"	Okay			Comment resolved.	90% BOD Apdx C Section C.10
417	DOI-162	Section C.12,		The following items are included in the Reference list but are not	The Jepson Flora Project is not listed as a reference in Section C. 12. The		Comment resolved.		Comment resolved.	90% BOD Apdx C Text in various

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		Page C-32		referenced in the text: Caltrans 2008; CH2M HILL 2004; CH2M HILL 2009; Freilich, Leitner & Carlisle, and Jepson Flora Project, 2010.	remaining four items (Caltrans 2008; CH2M HILL 2004; CH2M HILL 2009; Freilich, Leitner & Carlisle) will be added as references to the text.					sections
418	DTSC-128	Attachment B, Calculations, Remedy-produced Water Conditioning Process Caustic Usage, RAW data, page 6 of 6		Where did PG&E extract these concentrations from? What are the rationales for their use and how are they used in the calculations? This really is not explained.	These concentrations are based on laboratory analysis of samples of the backwash water from injection well IW-3 collected on October 5, 2011 (See page 1273 of the 60% BOD PDF, Item #4 under Givens/ Assumptions).	Okay.			Comment resolved.	Not applicable
419	FMIT-119 Hualapai-104 Chemehuevi-104 Cocopah-104 CRIT-104	Attach C		A friction angle of 38 degrees, used for fill and alluvial materials in the slope stability analyses, seems high in comparison to friction angle values presented in Exhibit C.1-1. The Modified Proctor maximum dry densities are at the high end of what could be expected (but they are not impossibly high, given that the material is well- graded (poorly-sorted) and contains minimal clay). Some consideration needs to be given to the friction angle of in-situ material versus the friction angle of compacted laboratory specimens tested in direct shear, assuming that we are concerned with slope stability of natural slopes vs. the stability of constructed slopes compacted to 90% of Modified Proctor maximum dry density.	The friction angle of 38 degrees used in the slope stability analysis should not be compared to the friction angles in Exhibit C.1-1 because the values are for different soils in different locations. The friction angles used for slope stability analysis are based upon a geotechnical investigation conducted in 2009 at AOC 4 on the southwest side of the station. The friction angles shown in Exhibit C.1-1 are based upon a geotechnical investigation conducted in 2004 for the Interim Measures No. 3 site on the north side of I-40 and approximately 3,000 feet from AOC 4. The design considered the difference in friction angle for in-situ soil versus remolded soils. This is demonstrated in Exhibit C.4-1 where different design friction angles are presented for compacted fill and native soil (App. C).			Comment resolved.	Comment resolved.	Not applicable
420	FMIT-120 Hualapai-105 Chemehuevi-105 Cocopah-105 CRIT-105	Attach C	Geotechnical Summary	It may be appropriate to consider the effect of partial saturation on apparent (ephemeral) cohesion in the granular site soils, especially as it relates to slopes maintainable during construction. Site soils may appear to be capable of greater slope stability when partially-saturated, versus their stability when dry.	PG&E does not consider the effects of partial soil saturation on soil strength to be important for this site for the conditions anticipated during construction or for the life of project.			Comment resolved.	Comment resolved.	Not applicable
421	FMIT-121 Hualapai-106 Chemehuevi-106 Cocopah-106 CRIT-106	Attach C	Geotechnical Summary	The slope stability analysis results do not appear to be presented in the report documentation.	Please see Appendix C, Attachment C, *Geotechnical Investigation, Topock AOC4 Remediation, Pre-Work Plan Data Collection Activities Technical Memorandum* (pages 5 and 6 of the TM or pages 1757 and 1758 of the 60% BOD PDF).			Comment resolved.	Comment resolved.	Not applicable

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422	DOI-163	Attachment C, Section C.1, Page C-1		This section references two different CH2M HILL 2009 documents, one from February and one from October. The in-text citations should correspond with the References section; therefore, the in-text citations need to be modified to CH2M HILL 2009a and CH2M HILL 2009b.	Section C.1 merely provides information on two reports, (e.g., their full titles and when they were published in 2009), and did not cite or extract any information from these reports, therefore, it is not necessary to cite them as references in this section.		Comment resolved.		Comment resolved.	Not applicable
423	DOI-164	Attachment C, Exhibit C.1-4, Page C-4	Notes	Should the citation for CH2M HILL 2009 be revised to CH2M HILL 2009b?	The letter "b" will be added after the year 2009.		Comment resolved.		Comment resolved.	90% BOD Appendix C Attachment C
424	DOI-165	Attachment C, Section C.3, Page C-8		The International Code Council 2001 is included in the Reference list but are not referenced in the text.	The title of this reference is the *2001 California Building Code (CBC)* by the International Code Council and the California Building Standards Commission (see the last reference in Section C.12). The *2001 CBC* is referenced in the text on page C-2, 2nd bullet (2nd sentence) and 4th bullet (last sentence).		Comment resolved.		Comment resolved.	Not applicable
425	DOI-166	Attachment C, Section 6.0, Page 16		The following items are included in the Reference list but are not referenced in the text: ASTM 1994; International Code Council 2000; International Conference of Building 1997; and United States Geologic Service 2003.	See page 4 for reference to ASTM. No changes to the 2004 report are proposed.		Comment resolved.		Comment resolved.	Not applicable
426	FMIT-122 Hualapai-107 Chemehuevi-107 Cocopah-107 CRIT-107	Attach E	Fire System Analyses	This technical memo has no stated source or date.	Source and date will be added to Attachment E in the 90% design submittal.			Comment resolved pending review of the 90% design documents.	Comment resolved.	90% BOD Appendix C Attachment E
427	FMIT-123 Hualapai-108 Chemehuevi-108 Cocopah-108 CRIT-108	Attach E	Fire System Analyses	The analysis doesn't explicitly consider NPSH requirements for either fire pump. NPSH criteria for the Allis Chalmers electric-motor-driven fire pump are provided but are illegible, and no criteria are presented for the ITT A-C diesel- motor-driven fire pump.	The net positive suction head (NPSH) available for the fire service pumps is 96.4 feet at design flows. The required NPSH for either of the pumps is not readily available from the manufacturers. However, cavitation is not expected to be a problem. Required NPSH values can vary from 2 to 30 feet. Even allowing for a 30% buffer and assuming required NPSH is 30 feet, the available NPSH should not be higher than 39 feet (30 * 1.30), which is significantly less than the 96.4 feet available. If cavitation was a problem, it should have been evident from annual pump testing.			Comment resolved.	Comment resolved.	Not applicable

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428	FMIT-124 Hualapai-109 Chemehuevi-109 Cocopah-109 CRIT-109	Attach E	Fire System Analyses	For an industrial facility mixing flammable liquids, the required fire flow seems low.	Please note that the volume of ethanol within a building during normal operations is less than 4 gallons (Including the pumps and piping). The following fire flow required was provided to the design team by PG&E's insurance company: a) MW-20 bench: 363 gpm sprinkler flow (1210 sq ft of 0.3 gpm/sq ft) plus a 500 gpm hose allowance for a fire hydrant. b) TW bench - 144 gpm sprinkler flow (480 sq ft of 0.3 gpm/sq ft) plus a 500 gpm hose allowance for a fire hydrant. It should be noted that extinguishing a fire in a sprinklered building requires on the average approx. 8% of the volume of water to extinguish a similar blaze in a similar, unsprinklered building. This is because the fire is quenched with water before it can accelerate out of control.			Comment resolved.	Comment resolved.	Not applicable
Specific Comments – Appendix D (Engineering Plans/Drawings)										
429	FMIT-125	General		There is no notation on the plans (i.e., in "General Notes" or elsewhere) indicating that the area is listed on the National Register of Historic Places, eligible for listing on the National Register as a Traditional Cultural Property and/or a sacred place and that all workers are subject to sensitivity training before working in the field. Such notations should appear on all plans to underscore the nature of the project area and demonstrate a commitment to cultural sensitivity. The plans may be the only project document some workers have contact with.	Workers will participate in site orientation and training on cultural/ historical resources sensitivity that will be provided at the project initiation meeting, to be held at the Topock Compressor Station. Site orientation will stress that all site activities will be conducted in a respectful manner. PG&E believes that this training should address the FMIT's concerns in this comment. However, the following text will also be added to the General Notes: "The project area is eligible for listing on the National Register as a Traditional Cultural Property and/or considered a sacred place by area American Indian Tribes; all workers are subject to sensitivity training before working in the field."			Comment resolved.	Comment resolved.	90% BOD Appendix D Drawing C-00-01.
430	DOI-167	G-10-01		The schematic includes a discharge line from pump PMP-205 going to the "Influent Tank Farm". This discharge line should be going to "Influent Tanks", since the location is already in the Influent Tank Farm.	This call out will be changed to show the pump returning fluids to the Influent Tanks.		Comment resolved.		Comment resolved.	90% BOD Appendix D Drawing I-11-04.
431	DTSC-129	Appendix D Page G-12-02	Mass Balance Remedy	Please use the operation pH range from 6 as mentioned in Section	This comment does not apply to this drawing. The text here will be	Okay.			Comment resolved.	90% BOD Appendix D Drawing G-12-02.

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			Produced Water	3.3.3.3 page 3-38 in the process description for consistency.	revised to be pH 6.5 in accordance with the Drawing G-12-04.					
432	DTSC-130	Appendix D Page G-12-03	Process Schematic for Freshwater Pre-Injection Treatment System	Please introduce pre-treatment chemical after the filters to save on overall dosage quantity as well as filter longevity. In addition, please consider the possible use of hydrochloric acid to save in amount used and efficiency.	See responses to comment #184 DTSC-72 and #185 DTSC-73. Hydrochloric acid was considered. However, since sulfuric acid is currently used for conditioning cooling makeup water, it is proposed to be used in the freshwater pre-injection treatment system to take advantage of the economy of scale.	Okay.			Comment resolved.	90% BOD Exhibit 3.3-6.
433	DTSC-131	Appendix D Page G-12-03	Process Schematic for Freshwater Pre-Injection Treatment System	The proposed use of wastewater in the cooling tower or reinjection in the in situ reactive zone wells may present challenges in obtaining the quantity and quality diverted. Please provide specific water quality parameters required and viability for the proposed reuse of each said reuse.	See RTC #181 DTSC-70.	Noted. See RTC #181 DTSC-70.			Comment resolved.	Not applicable
434a	FMIT-126	Append D1 “C”-Drawings		Based on the information presented in Appendix D-2 (C-Drawings), in deciding to place nearly all utility (water, electrical, fiber-optic, etc.) services below ground, the designers apparently gave no consideration to Tribal preferences or to an earlier-stated tribal preference to have that infrastructure placed above-ground, thereby minimizing earth disturbance. Above ground piping also appears supported in at least certain areas by the draft GeoArchaeological Report	See response to comment #8a FMIT-3. The Tribe’s comments expressing a preference for aboveground facilities were noted and considered. While PG&E recognizes the Tribe’s expressed preference, the facilities are proposed below ground because that is consistent with the analysis in the EIR. (See, e.g., EIR, Vol. 2, at 1-6.) Placing facilities aboveground creates potentially significant aesthetic, O&M, and safety impacts. Further, while aboveground utilities may reduce earth disturbance to some extent, aboveground facilities would still require earth disturbance for foundations, vaults, and other supporting equipment. PG&E believes that the proposed 60% design represents the most appropriate design in the Topock site setting while incorporating the Tribes’ preferences to the extent practicable, is most protective of remedy infrastructure, most O&M friendly for the decades-long life of this remedy, and most consistent with the certified EIR. The draft geoarchaeological report (July 2013) presents results from the geoarchaeological assessment of the Project Area, and ranks locations where sediments have the highest,				This comment and response are being discussed as part of the evaluation of aboveground piping alternatives (#1 DOI-1, #8a FMIT-3, and #8b Hualapai-3/ Chemehuevi-3/Cocopah-3/CRIT-3).	The 90% design complies with the Agencies’ directive on aboveground/ belowground pipeline infrastructure in the April 4, 2014 letter titled *“Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site”*.

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				(July 2013).	intermediate, lowest, or no potential to contain buried archaeological resources. As discussed at the August 20, 2013 TMU meeting, this ranking is relative rather than absolute – higher potential does not mean that archaeological materials are likely to be encountered, but rather the stratigraphic unit with this designation is more capable of containing buried archaeological materials than other units. Therefore, the potential ranking only represents relative probability and does not predict actual locations of buried archaeological materials or suggest preferred locations for aboveground vs. belowground piping and utilities.					
434b	Hualapai-110 Chemehuevi-110 Cocopah-110 CRIT-110	Append D1 "C"-Drawings		Based on the information presented in Appendix D-2 (C-Drawings), in deciding to place nearly all utility (water, electrical, fiber-optic, etc.) services below ground, the designers apparently gave no consideration to Tribal preferences or to an earlier-stated tribal preference to have that infrastructure placed above-ground, thereby minimizing earth disturbance.	See response to comments #8a FMIT-3 and #434a FMIT-126.				This comment and response are being discussed as part of the evaluation of aboveground piping alternatives (#1 DOI-1, #8a FMIT-3, and #8b Hualapai-3/ Chemehuevi-3/Cocopah-3/CRIT-3).	The 90% design complies with the Agencies' directive on aboveground/ belowground pipeline infrastructure in the April 4, 2014 letter titled *"Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site"*.
435	FMIT-127 Hualapai-111 Chemehuevi-111 Cocopah-111 CRIT-111	Append D1 Sheet C-00-01 "General Notes"	*"3. No excavated material shall be stored on site except as approved by owner"* *4. Dispose of unusable excavated materials at no additional cost to the owner"*	This project has very specific requirements regarding all soil excavated at the site. These "general notes" while typical of most construction projects are inappropriate for this project. The contractor should be referred to the specific documents detailing soil handling for this project. Additionally, the procedure under development for handling displaced soils needs to be referenced.	Comment noted. These notes will be revised to state: "Management of displaced soils shall be in accordance with the Soil Management Plan (Volume 4 of the O&M Manual) and the Management Protocol for the Handling and Disposition of Displaced Site Materials (Appendix B of the Soil Management Plan)."			Comment resolved.	Comment resolved.	90% BOD Appendix D Drawing C-00-02.
436a	FMIT-128	Append D1 Design Drawings ("C"-drawings)		**SEE EXHIBITS I to IV submitted with these comments:** Construction of pipe sections A & H, as presented in the 60% BOD report (see Exhibit I) will involve considerable soil excavation, surface disturbance, soil testing, soil transport, soil processing and, possibly, soil storage in an extremely culturally sensitive area. An alternative approach, with much less excavation and surface disturbance,	See response to comment #1 DOI-1 and pipeline evaluation matrix (see **Attachment A**, at the end of this table).			The FMIT provided the tribe's assessment and comments on the alternative pipeline routings. The Tribe's comment letter is included in **Attachment A**, at the end of this table.	Information presented in DOI's pipeline evaluation matrix and associated visualizations were discussed with the agencies, Tribes, and stakeholders at the November 19-20, 2013 TWG meeting. Tribes' response was presented at the December 17-18, 2013 TWG meeting and subsequently provided in a draft technical memorandum from TRC (Charlie Schlinger) to	The 90% design complies with the Agencies' directive on aboveground/ belowground pipeline infrastructure in the April 4, 2014 letter titled *"Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site"*.

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				and consistent with already-stated Tribal preferences, is as follows: Obtain 12 kV power from the City of Needles and step it down to 480 V near IM-3 using a dedicated transformer. This would require coordination and possible partnership, with the City of Needles, as they are planning an upgrade of the line capacity, at least as far as the Pirate's Cove development. Distribute the 480-V power to the planned (and possible contingency) IRL & FW wells using conventional above-ground power lines and poles, with a nominal spacing of100-150 feet. See Exhibit II. This approach to the electrical supply would possibly eliminate the need for step-down transformers at each major point of use. Alternatively, if line losses at 480 Vare too high, or if other constraints dictate, distribute the 12 kV power on above-ground power lines and poles, and step down the voltage at each major point of use. Also, pole mounts of transformers could be considered. Use wireless SCADA (Supervisory Control and Data Acquisition) communication technology (which is highly developed) instead of fiber optic technology for monitoring and control, or hang fiber optic cables using the electrical power poles. The wireless approach would require aerial antennas for communication with the project control center. Construct water lines in a manner similar to existing above-ground IM water lines or the existing above-ground freshwater water Topock Compressor Station supply line (exposed pipe). See Exhibits III & IV for two possible above- ground waterline location alternatives (Alternatives I & II) for pipe sections A & H. This differs from the design in the 60% BOD report in that almost all utility infrastructure would be above-ground. Along limited portions of pipe sections A & H, as needed, the above-ground water lines could/may need to be placed in an above-ground concrete box. Along limited portions of the pipe section A, aerial bridge crossings (such as the one presently					PG&E, DTSC, and DOI/ BLM dated Dec 17, 2013 (also included in **Attachment A**, at the end of this table). A site walk was held on Dec 27, 2013 to further discuss the piping options. Representatives from DOI, FMIT, Hualapai Tribe, Chemehuevi Tribe, TRC, and PG&E participated in the site walk. A presentation was made by TRC (Charlie Schlinger) at the January 23, 2014 TWG meeting (presentation materials are included in **Attachment A**, at the end of this table). Additional analysis was performed by PG&E on Segments 1 and 2 of Pipeline A, and presented at the February 11, 2014 TWG meeting. Presentation materials are also included in **Attachment A**, at the end of this table.	

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				planned for the Bat Cave Wash) crossing, would be used or underground installations would be utilized. In addition to reduced excavation costs (at the time of construction, possibly during the project life- cycle, and at decommissioning) and ground disturbance. This overall approach would greatly reduce the excavation volume required, though the electrical, water and SCADA/communication infrastructure would be visible and subject to vandalism. As part of the communication system, cameras could be installed for monitoring. The Tribes request that this Utility Alternative be studied and presented as part of the CEQA process. NOTE: Exhibits I-IV show approximate locations only.						
436b	Hualapai-112 Chemehuevi-112 Cocopah-112 CRIT-112	Append D1 Design Drawings ("C"-drawings)		**SEE EXHIBITS I to IV submitted with these comments:** Construction of pipe sections A & H, as presented in the 60% BOD report (see Exhibit I) will involve considerable soil excavation, surface disturbance, soil testing, soil transport, soil processing and, possibly, soil storage. An alternative approach, with much less excavation and surface disturbance, and consistent with already-stated Tribal preferences, is as follows: Obtain 12 kV power from the City of Needles and step it down to 480 V near IM-3 using a dedicated transformer. This would require coordination and possible partnership, with the City of Needles, as they are planning an upgrade of the line capacity, at least as far as the Pirate's Cove development. Distribute the 480-V power to the planned (and possible contingency) IRL & FW wells using conventional above-ground power lines and poles, with a nominal spacing of 100-150 feet. See Exhibit II. This approach to the electrical supply would possibly eliminate the need for step-down transformers at each major point of use. Alternatively, if	See response to comment #436a, FMIT-128.			The Hualapai Tribe and the Cocopah Indian Tribe each provided the tribe's assessment and comments on the alternative pipeline routings. The CRIT also provided feedback via email on this subject. The Tribes' letters and email are included in **Attachment A**, at the end of this table.	Information presented in DOI's pipeline evaluation matrix and associated visualizations were discussed with the agencies, Tribes, and stakeholders at the November 19-20, 2013 TWG meeting. Tribes' response was presented at the December 17-18, 2013 TWG meeting and subsequently provided in a draft technical memorandum from TRC (Charlie Schlinger) to PG&E, DTSC, and DOI/ BLM dated Dec 17, 2013 (also included in **Attachment A**, at the end of this table). A site walk was held on Dec 27, 2013 to further discuss the piping options. Representatives from DOI, FMIT, Hualapai Tribe, Chemehuevi Tribe, TRC, and PG&E participated in the site walk. A presentation was made by TRC (Charlie Schlinger) at the January 23, 2014 TWG meeting (presentation materials are included in **Attachment A**, at the end of this table). Additional analysis was	The 90% design complies with the Agencies' directive on aboveground/ belowground pipeline infrastructure in the April 4, 2014 letter titled *"Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site"*.

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				line losses at 480 V are too high, or if other constraints dictate, distribute the 12 kV power on above-ground power lines and poles, and step down the voltage at each major point of use. The use of pole-mounted transformers should be strongly considered to avoid additional ground disturbance. Use wireless SCADA (Supervisory Control and Data Acquisition) communication technology (which is highly developed) instead of fiber optic technology for monitoring and control, or hang fiber optic cables using the electrical power poles. The wireless approach would require aerial antennas for communication with the project control center. The use of fiber optic technology would require that fiber optic service be brought in to the IM3 area, parallel to the proposed above-ground water lines, or along the existing City of Needles 12kV service infrastructure, possibly originating near the Transwestern bench area. Construct water lines in a manner similar to existing above-ground IM water lines or the existing above-ground freshwater water Topock Compressor Station supply line (exposed pipe). See Exhibits III & IV for two possible above-ground waterline location alternatives (Alternatives I & II) for pipe sections A & H. This differs from the design in the 60% BOD report in that almost all utility infrastructure would be above-ground. Along limited portions of pipe sections A & H, as needed, the above-ground water lines could may need to be placed in an above-ground concrete box. Along limited portions of the pipe section A, aerial bridge crossings (such as the one presently planned for the Bat Cave Wash) crossing, would be used or underground installations would be utilized. In addition to reduced excavation costs at the time of construction, possibly during the project life-cycle, and at decommissioning) and ground disturbance, this approach could possibly eliminate the need for some					performed by PG&E on Segments 1 and 2 of Pipeline A, and presented at the February 11, 2014 TWG meeting. Presentation materials are also included in **Attachment A**, at the end of this table.	

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				sections of dual-wall pipe. This overall approach would greatly reduce the excavation volume required, though the electrical, water and SCADA / communication infrastructure would be visible and subject to vandalism or other physical damage. In addition, limitations on vehicular access to the little-used portion of old Route 66, between Park Moabi Road on the west side and National Trails Highway on the east, could be explored, e.g., with gated access on each end and with pedestrian access allowed, for the period of remedy operation. We believe that the east and west ends of Route 66 have apparently been signed for several years to discourage access by the public. This action, which would require agency buy-in, would reduce objections associated with the use of above-ground infrastructure. As part of the communication system, cameras could be installed for monitoring. The Tribes request that this Utility Alternative be studied and presented as part of the CEQA process. NOTE: Exhibits I-IV show approximate locations only.						
437	FMIT-129 Hualapai-113 Chemehuevi-113 Cocopah-113 CRIT-113	Append D1 Design Drawings ("C"-drawings)		Construction of pipe sections B1 & B2 as presented in the 60% BOD report, will require considerable excavation and corresponding surface disturbance. An alternative design is as follows. Utilize above-ground water piping (as is presently done). The 12 kV service along pipe section B1 could be done using above-ground (aerial) distribution on conventional poles, or, per the design, with a minimal trench.	See response to comment #1 DOI-1 and evaluation matrix (see **Attachment A**, at the end of this table).				Information presented in DOI's pipeline evaluation matrix and associated visualizations were discussed with the agencies, Tribes, and stakeholders at the November 19-20, 2013 TWG meeting. Tribes' response was presented at the December 17-18, 2013 TWG meeting and subsequently provided in a draft technical memorandum from TRC (Charlie Schlinger) to PG&E, DTSC, and DOI/ BLM dated Dec 17, 2013 (also included in **Attachment A**, at the end of this table). A site walk was held on Dec 27, 2013 to further discuss the piping options. Representatives from DOI, FMIT, Hualapai Tribe, Chemehuevi Tribe, TRC, and	The 90% design complies with the Agencies' directive on aboveground/ belowground pipeline infrastructure in the April 4, 2014 letter titled *"Directives on Outstanding Issues of the Response to Basis of Design Report/ Intermediate (60%) Design Comments for PG&E Topock Compressor Station Remediation Site"*.

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									PG&E participated in the site walk.	
438	FMIT-130	C-05-06 C-07-10		Power and communication Node 5 is currently designed to be constructed due north of IRL-3's well and meter vault. The node is approximately ~15'-20' north of the vaults and on top of a crest (~12'-15') above the well vaults. Construction of this Node will cause a great disturbance to the surrounding land, and its current construction location will create a visual eye sore with the surrounding area. Redesign to reduce impacts should be sought.	In response to this comment, Node 5 will be relocated down the slope on a flat spot to be created by earthwork. As a result, all equipment will be spread out laterally along the road (about 100 feet) to ensure adequate space for O&M (see figure in **Attachment J**, at the end of this table). Drawing C-05-06 will be revised to reflect this detail. The proposed relocation will remain the same if the aboveground option is selected for piping. Under either proposal piping between the relocated equipment and IRL-3 will be underground.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Appendix D Drawing C-05-06.
439	FMIT-131	C-05-06		Pull Boxes PBX-D5C and PBX-T5C sizes do not match between C-05-06 and E-00-08. Also the pull boxes are very large, in respects to the amount of fiber optics running through them. What can be done to reduce size?	Size of the pull boxes will be updated in the 90% drawings.			The issue will be revisited pending the decision of aboveground vs. belowground piping.	PG&E will update the size of pull boxes in the 90% design and submit for review and comment.	90% BOD Appendix D Drawings C-05-06 and E-00-08. As noted, PG&E is evaluating options to optimize Node 5 footprint.
440	FMIT-132	C-02-01		Pull Boxes E and C are on the North side of the existing dirt road, while the FW-1 vaults are on the south side. Is it necessary to split the pull boxes from the well vaults, disturbing both sides of the road?	The pull boxes were located on the north side because of space constraint on the south side of the road and to avoid having to shutdown IM-3 injection during construction. Further, future maintenance and repair would be more difficult and less safe due to a lack of space if the pull boxes and well vaults were both located on the same side of the road (see figure in **Attachment J**, at the end of this table). Drawing C—02-01 will be revised to reflect this detail.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Appendix D Drawing C-02-01.
441	DTSC-132	Appendix D Page C-05-01 and C-05-02	IRL-4 Access Road Site Plan	Please combine the plan and profile if possible for ease of use in design and construction.	Comment noted. PG&E will evaluate the possibility of combining the cited plan and profile drawings as requested, and will include in the 90% design.	Response noted. Comment deferred to 90%.			Noted.	90% BOD Appendix D Drawings C-05-01 and C-05-02. The possibility of combining these drawings was evaluated. For clarity and ease of use in construction, these drawings will remain as two separate drawings.
442	FMIT-133	C-05-03 C-05-05 C-07-10		Currently IRL-2 location is of great concern. The disturbance to the local area during construction and after during monitoring will have heavy impact to the Maze both physically and visually. As previously mentioned in meetings between FMIT and PG&E, FMIT recommends further rigorous evaluation of an alternative locations	In response to this comment, PG&E evaluated what would be required to relocate IRL-2 closer to the road. Taking into consideration the Southwest gas ROW, the remedy piping corridor, and the space required for drilling and O&M of this well, PG&E will need to cut into the bank of the road on the north side			The Tribe would like to see visualizations of both options and further discussion prior to the 90% design.	This comment and response were discussed with Tribes at the December 12, 2013 TWG meeting, and the December 27, 2013 site walk. The requested visualization of IRL-2 was provided on December 17, 2013 and included in **Attachment J** at the end of this	90% BOD Appendix D Drawings C-05-03 and C-05-05.

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				closer to the road adjacent to the main pipeline.	and install a retaining wall to prevent slough off or caving (see figure and visualization in **Attachment J**, at the end of this table). PG&E does not recommend IRL-2 be relocated due to the required amount of earthwork and associated disturbance, as well as the construction challenges on a slope.				table. In response to the Tribes' preference for no additional cuts would be made into the banks on either side of the roadway, IRL-2 location will remain as proposed in the 60% design.	
443	DTSC-133	Appendix D Page C-07-17 and C-07-18	Pipeline Plan and Profile	Please provide a reference and detail for the above ground supports.	Please see drawing C-07-67 for aboveground supports. PG&E will evaluate the aboveground supports in the 90% design.	PG&E's proposal for above ground support appears excessive for non-hazardous water.			PG&E will evaluate the aboveground supports in the 90% design.	Not applicable because this portion of Pipeline B (formerly Segment B4) was brought underground. See Appendix D Drawings C-07-28, -29, and -103 (Segment B2).
444	FMIT-134	C-07-02 C-07-54		Pipeline J - Purpose of this Line? It is taking water from the RAW line before it is treated. (Two lines from raw water line with isolation valves).	Pipeline J is the main trunk connecting Pipeline B, the freshwater supply pipeline from the Arizona wells, to the FW and IRL wells in the uplands. This allows for direct pumping from the supply well(s) to the injection wells, and reduces electricity use. See also drawing G-00-06 (blue line). In the event that pre-injection treatment of freshwater supply is needed, all freshwater would first be pumped to the treatment system at the Compressor Station via Pipeline B. The treated freshwater would then flow to the uplands injection wells, along the Station access road following Pipeline F (see drawing C-07-01 for key map). The pipes will be installed if the contingency action is required. At the time the construction is complete, isolation valves will be closed on Pipeline J to prevent untreated freshwater from flowing to the injection wells.			Comment resolved pending review of 90% design documents.	Comment resolved.	Not applicable
445	DTSC-134	Appendix D Page C-07-74, Detail C12	Trench Sections	Please provide the footing design for the pipe support.	The pipe support referenced was designed to be anchored into the rock surface that was expected to be located directly under the road bed. Subsequent investigation has revealed that it may be possible to place the pipe in a more traditional trench. This will be evaluated during the 90% design process and presented in the 90% Design Submittal.	Ok pending review of 90%. However, PG&E should consider minimizing footprint and infrastructure in respect for the Tribal sensitivity of the area.			Comment resolved.	90% BOD Appendix D Drawing C-07-109
446	FMIT-135	C-08-01 S-06-06		Currently there are four new structures planned for the Transwestern Bench area. The carbon	PG&E disagrees with the assertion regarding the level of ground disturbance. Field inspection and			Comment resolved. The Tribe requests that details be presented prior to submittal	Comment resolved.	90% BOD Appendix D Transwestern Bench 08 Drawings

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				amendment building and carbon storage tanks will be built on the south side of the decon pad, 25-30 ft of undisturbed ground will have to be leveled for construction. Construction of the new storage building, on the west side of the decon pad, will require cutting into a ~15'-20' undisturbed hillside, and the construction of a retaining wall. Lastly, the new two story maintenance facility is extremely large, and will also require that undisturbed areas are disturbed for construction purposes. What can be done to reduce this level of landform disturbance?	historical account of excess fill materials from TCS construction used at the TW Bench indicate that the footprint of the carbon amendment building and carbon storage tanks is located in primarily fill materials. The maintenance facility would require a cut of about 5 feet into the hillside. However, as discussed in response to comment #26 DTSC-4, in order to reduce the infrastructure on the TW Bench, PG&E is evaluating an option of moving some functions originally intended to occur at the TW Bench - training, conference room, library, laboratories, maintenance, and storage – to a location at Park Moabi. Concurrently, PG&E is evaluating a revised layout of the potential remaining functions at the bench. PG&E will keep the agencies, Tribes, and stakeholders informed of PG&E's proposal regarding location and layout prior to the 90% design submittal.			of the 90% design. The Tribe further requests that PG&E verify that the excavation will be limited to actual fill materials.		(i.e., Function Code 08 Drawings)
447	FMIT-136	C-02-01 C-05-03 C-05-05 C-05-06 C-07-09 C-07-10 C-07-11 C-07-12 C-07-13 C-07-14		With IM-3 remaining potentially operational until after the final groundwater remedy is up and running, is it possible to construct and install the groundwater remedy's wells, injection pipeline, trenching, and conduit (See Referenced Sheets) while the IM-3 components are still in place? The proposed locations for the new remediation components are in the exact same locations as the old IM-3 system. Is there enough room to construct and install the new system around the old, without being forced to disturb an even greater area? Can any of the existing IM-3 components at these locations be decommissioned consistent with whatever need has been identified for maintaining the IM-3 treatment plant?	Yes, it is possible. Construction approaches will be included in the forthcoming Construction/Remedial Action Work Plan. All efforts will be made to minimize the amount of disturbance during construction. PG&E understood that the second question in the comment to ask if partial decommissioning of the IM-3 infrastructure can be done as part of construction of the full-scale remedy. The response to this question is partial decommissioning of the IM-3 infrastructure cannot be done. Additionally, note that the criteria for decommissioning IM-3 are specified in the 2012 Settlement Agreement between DTSC and the FMIT. In accordance with the agreement, the decommissioning plan will not recommend decommissioning of the IM-3 facilities until the Plume Control Criteria are met and DTSC determines that the groundwater remedy is achieving plume control, DOI determines that the remedy is operational and functional, and DOI concurs with DTSC's determination to decommission IM-3. The settlement agreement also provides,				PG&E and the Tribe discussed this comment and response at the December 17-18, 2013 TWG meeting.	Construction/Remedial Action Work Plan Section 3.

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					however, that “DTSC' s determination of Plume Control . . . must be made concurrent with or after DTSC's OPS determination, unless DTSC in its lawful discretion, decides that decommissioning of IM-3 can occur prior to DTSC's OPS Determination; and DOI must concur with DTSC's decision to decommission IM-3.”					
448	FMIT-137	C-07-69 C-07-70 C-07-71 C-07-72		With pipelines being placed in open air concrete trenches, has pipeline expansion and contraction been taken into account for the total length of trenching required?	Pipeline expansion/ contraction has been accounted for. Two different methods will be shown in the 90% design – expansion joints or pipeline anchors (provided at 200 foot spacing or at each joint whichever is closer).			Comment resolved.	Comment resolved.	90% BOD Appendix D.
449	DTSC-135	Appendix D Page M-02-02	Freshwater Injection Well Construction Details	Please note that the text prescribes stainless steel continuous wrapped well screens as opposed to the provided louvered screens in the notes section. Please correct accordingly based on the final proposed well screen chosen.	The details of the wells design are still being developed. The text in Section 3.3.3 will be expanded to more fully describe the well design for each type of well and the drawings will be made consistent with the text at the 90% design.	Okay			Comment resolved.	90% BOD Section 3.3.3.
450	DTSC-136	Appendix D Page M-02-02	Freshwater Injection Well Construction Details	Please provide a neat cement seal between the annular space of the inner and outer well casings.	The space between the conductor casing and the inner casing will be sealed by the wellhead flange. Not clearly shown on the drawings included in the 60% BOD is the sanitary seal at the top of the inner casing. This type of construction provided for in California State Well Standards Bulletin 74-81 (see Figure 5b in the attachment to the RTCs). Drawings on Sheets M-02-01 and M-02-02 will be revised to more clearly show the seal on the inner casing. The FW Injection wells are being constructed in this way to allow for the possibility of reconstructing the wells by pulling the inner casing, removing the clogged gravel pack and the inner few inches of the borehole wall, and reconstructing the well in the original borehole. If successful, this could allow for reconstruction of an injection well without the need to drill another borehole. The ability to successfully pull the inner casing in an old well where the gravel pack may be cemented by mineral precipitates is uncertain, however this method of well construction is proposed to allow for that possibility. If neat	Comment resolved pending review of the 90%. Also consider bentonite seals for saturated zones.			Comment resolved.	90% BOD Appendix D Drawing M-02-02.

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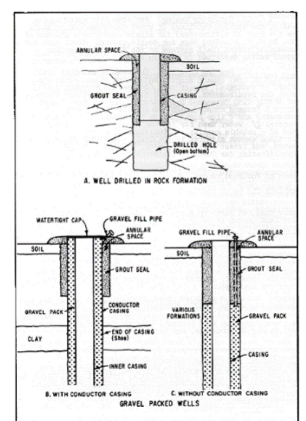
					cement were installed between the conductor and the inner casing, it would not be possible to pull the inner casing and reconstruction of the well in the original borehole will be significantly more complicated. However, based on data collected during construction, it might be determined that installation of grout between the casings is advantageous. For this reason additional design drawings for an alternative well construction, which includes a neat cement seal between the casings (provided a permanent conductor casing is installed) will also be included in the 90% BOD. The application of a cement seal will be assessed during the 90% design and potentially during construction.  Figure 5. SEALING CONDITIONS FOR UPPER ANNULAR SPACE-HARD ROCK FORMATIONS AND GRAVEL PACKED WELLS					
451	DTSC-137	Appendix D Page M-02-02	Freshwater Injection Well Construction Details	Please define the ¼" ASR hydraulic oil line in the well more clearly.	The drawing will be revised to show the hydraulic line connected to the downhole flow control valve and indicate that only food grade mineral oil will be used in the hydraulic system controlling the downhole valve.	Okay			Comment resolved.	90% BOD Appendix D Drawing M-02-02 (revised to more clearly show the hydraulic line).
452	FMIT-138	M-03-05		Injection meter and well vaults inside diameter = 5'x8'-6" and 4'x5' respectively. Vaults appear large for the 2-inch and 3-inch pipelines. Can these be reduced? Also, flow arrow for backwash line reversed.	Injection and extraction well vault sizes in the 60% design were included as "typical" sizes and were not specifically designed or sized for each specific location. Each well vault will be evaluated and the size adjusted, as needed, during the 90% design process. Comment is noted regarding the flow arrow and will be addressed in the 90% design.			Tribe prefers smaller footprint, smaller vault.	Comment resolved.	90% BOD Appendix D Drawing M-03-05.
453	FMIT-139	M-02-01		Large vaults result in greater disturbance of land for FW-series,	M-02-01 only details the FW and not the IRL injection wells. The IRL well			Comment resolved pending review of the 90% design	Comment resolved.	90% BOD Appendix D Drawing M-02-01. The comment was

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				IRL-series wells. Can butterfly valve in injection line between FCV and FCA be eliminated, seems like extra component given butterfly valves at entrance and exit of vault. Also consider swapping FCV and flow meter to minimize potential for FCV to introduce flow disturbance prior to flow meter.	vault dimensions are identified on M-05-05. As part of the 90% design, PG&E will review this to evaluate whether the vault length can be reduced by taking out one valve. Since this change will occur on the smaller FW pipe, it is unlikely to change the required length for the larger RW pipe.			documents.		considered and an evaluation was conducted as indicated in the response. Results from the evaluation indicate that all valves are needed and need to kept for maintenance purposes.
454	FMIT-140	E-00-21		Node 5 communication panel located near IRL- 3 is 90"x36". Can the panel size be reduced?	PG&E will evaluate a smaller panel size (up to 18" shorter in height) and propose a final panel size in the 90% design, after important design details such as aboveground vs. belowground piping and conduits have been settled.			The issue will be revisited pending the decision of aboveground vs. belowground piping.	PG&E will evaluate a smaller panel size and propose a final panel size in the 90% design for review and comment.	90% BOD Appendix D E-00-21. At this 90% stage, Node 5 communication panel is designed to support all remedy communications in the uplands related to planned wells FW-1, IRL-1 to 4, and future provisional wells IRL-5 to 7. This eliminates the need for additional equipment for future provisional wells and the associated disturbance with installation of the equipment. The panel size is appropriate for this type of installation and intended use at Topock. PG&E will continue to seek ways to reduce the panel size while balancing the need for and the ability to properly maintain the equipment over multiple decades.
Specific Comments – Appendix E (Draft Specifications)										
455	DOI-168	Part 3, Division 1, Section 01 11 00, Part 1, 1.01, B, 1		The Summary of Work includes installation of 51 new remedy wells. Section 3 of the main text identifies installation of the following remedy wells; 24 NTH injection, four NTH extraction, five river bank extraction, four IRL injection, two TWB extraction, five ER extraction, two TCS injection, and two FW. This accounts for a total of 48 wells (not including provisional wells). Please review and clarify.	Comment noted. The Summary of Work will be revised at 90% stage to reflect the well count at 90% design.		Comment resolved pending review of 90% design.		Comment resolved.	A summary of borehole count is provided in Tables ES-2A and 2B of the 90% BOD. The Summary of Work will be prepared after the design is finalized.
456	DOI-169	Part 3, Division 1, Section 01 11 00, Part 1, 1.01, B		Suggest revising the Summary of Work to include more specific language regarding facilities and design components to be constructed. It is not clear that all design elements are incorporated as currently written (i.e., see Exhibit 3.5-1, truck loading/unloading stations, central maintenance and storage buildings are not discussed in the work summary).	Comment noted. The Summary of Work will be updated at 90% stage.		Comment resolved pending review of 90% design.		Comment resolved.	The Summary of Work will be prepared after the design is finalized.
457a	FMIT-141	Appendix E Sect	Section 2.01	The 60% BOD report indicates that	The subject specification section, 03			Comment resolved pending	Comment resolved.	Not applicable

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		03 30 00 Page 15-16	Materials C. Admixtures	underground concrete vaults carrying high voltage conduits are to be marked with red-dyed concrete. However no specific product is provided for technical review. General information available for underground concrete dyes indicate that electrical concrete envelope shall contain red dye at 8 lbs. per cubic yard of concrete. Based on this standard concentration it is concluded that significant amounts of this dye will be used as part of the remediation system design and could be potentially released into the subsurface. The 60% BOD report provides no recommendations on the specific product that will be used or environmental safety requirements for this dye. It is requested that PG&E provide information on the specific dyes that will be used and ensure that the selected dyes have been adequately characterized for environmental hazards (i.e. aquatic toxicity, persistence and bioaccumulation) and for use in this sensitive area.	33 00 (Cast-In-Place Concrete), contains information about the pigments that may be used to color the electrical duct banks. General pigment characteristics are specified in Article 2.01.C.1. More detailed pigment characteristics are specified in Article 2.01.C.9. That Article also specifies requirements by referencing reputable widely-used nationally-recognized product standards. PG&E believes that the specified properties in the subject specification align our goals with the Tribes' goals in terms of using sustainable products to meet the objectives of the project. It is not standard practice to specify a specific pigment product during design because the engineer cannot know all of the other products that will be in the concrete mix. As a result, the designer cannot determine compatibility and may accidentally specify a product that reacts with other materials in the mix and adversely affects concrete performance. It is standard practice to specify material requirements for the pigments as done in the subject specification section. This allows the construction contractor to propose and submit a concrete mix with compatible products. It also allows the construction contractor to propose more innovative products that may not have been available or known at the time of design. The contractor's proposed products will be submitted for review and approval before use per Article 1.04.A.1.c.5. Although Article 2.01.C.9 does mention electrical duct banks, the subject specification section does not appear to mention underground concrete electrical vaults. It is an industry best practice to color underground concrete electrical duct banks to improve safety; however, PG&E is not aware of colored concrete being used for underground vaults. PG&E agrees to provide pigment information to the tribe, if requested when it becomes available.			review of 90% design documents.		

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457b	Hualapai-114 Chemehuevi-114 Cocopah-114 CRIT-114	Appendix E Sect 03 30 00 Page 15-16	Section 2.01 Materials C. Admixtures	The 60% BOD report indicates that underground concrete vaults carrying high voltage conduits are to be marked with red-dyed concrete. However no specific product is provided for technical review. General information available for underground concrete dyes indicate that electrical concrete envelope shall contain red dye at 8 lbs. per cubic yard of concrete. Based on this standard concentration it is concluded that significant amounts of this dye will be used as part of the remediation system design and could be potentially released into the subsurface. The 60% BOD report provides no recommendations on the specific product that will be used or environmental safety requirements for this dye. It is requested that PG&E provide information on the specific dyes that will be used and ensure that the selected dyes have been adequately characterized for environmental hazards (i.e. aquatic toxicity, persistence and bioaccumulation)	See response to comment #457a FMIT-141 above.			Comment resolved pending review of 90% design documents.	Comment resolved.	Not applicable
458	MWD-13	Appendix E/ 31 10 00-6	Site Clearing	Due to sensitivities, please clarify whether onsite debris burning will be prohibited. Section 3.13 A.3 indicates that "Burning of debris onsite will not be allowed"; however, the following sections include provisions for when debris may be burned onsite.	This section will be revised to indicate no burning is allowed.				Comment resolved.	90% BOD Appendix E Specification 31 10 00.
Specific Comments – Appendix F (Remedy-produced Water Management Technical Memorandum)										
459	MWD-14	Appendix F/ F-12	Table F-5 Summary of Disposal/ Reuse Options Under Evaluation	Text indicates trucking-offsite will require constructing a loading station at TCS or the MW-20 bench location. Would the loading station design consider storage of anticipated 7.6 MG of wastewater? The TCS site should be preferred over the MW-20 bench location, since the remedy-produced water conditioning building is located at the TCS site.	To maintain operational flexibility, there will be two loading stations – a new station inside the compressor station and a modified station at the MW-20 Bench. There will not be any additional water storage due to space limitations at both locations.				Comment resolved.	Not applicable
460	DTSC-138	Appendix F Page F-14	Remedy-Produced Water Management Plan	Please expand upon the effluent limits for the cooling Tower and IRZ well options.	See response to comment on #181 DTSC-70.	Response noted. See response to comment on #181 DTSC-70.			Comment resolved.	Not applicable
461	DTSC-139	Appendix F Page F-14	Remedy-Produced	Please provide a contingency to address the fact that actual dissolved	The primary line of defense against well fouling is proper well	DTSC is mainly concern with well fouling if dissimilar water			Comment resolved.	O&M Contingency Plan (Volume 3 of the O&M Manual), Appendix

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			Water Management System Design – Design Criteria – 6th Bullet	constituents for the remedy prove dissimilar to the existing or future aquifer water quality.	maintenance. The following text will be added to the end of the 4th bullet on page F-14. "Wells will be maintained following procedures described in Section 4.2 of the O&M Manual Volume 1. These procedures are designed to be applied flexibly based on observation and measurement during well monitoring, maintenance, and rehabilitation. Rehabilitation can include the use of mechanical methods, application of different chemicals, and more frequent rehabilitation events. As the rehabilitation effort increases, PG&E may ultimately decide to reconstruct or replace a well." In the event that poor water quality is encountered in water generated from well maintenance (e.g., presence of scaling ions, low or high pH, high suspended solids), Table 2.2-1 of the Contingency Plan (O&M Manual Volume 3) has identified mitigation measures for these contingencies in design and operations.	quality would be returned to the formation. Describe PG&E's contingency if well maintenance is not successful. Comment resolved.				A.
462	MWD-15	Appendix F/ F-14	Trucking off-site to permitted disposal facility	If remedy-produced water (plus misc. flows) can't be reused onsite, the project proposes to dispose of the water offsite. Identify the proposed permitted disposal facilities which would accept this water.	Potential disposal facilities will be identified and included in the 90% design.				Comment resolved.	O&M Manual Volume Section 6.1.5.

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463	DTSC-140	Appendix F Page F-16	Remedy-Produced Water Management System Design – Design Criteria – 3rd Bullet	Please provide the possible future options for the solids removal, neutralization, and dissolved constituent removal for the strict water quality requirements.	The primary line of defense against well fouling is proper well maintenance. The following text will be added to the end of the 4th bullet on page F-14. “Wells will be maintained following procedures described in Section 4.2 of the O&M Manual Volume 1. These procedures are designed to be applied flexibly based on observation and measurement during well monitoring, maintenance, and rehabilitation. Rehabilitation can include the use of mechanical methods, application of different chemicals, and more frequent rehabilitation events. As the rehabilitation effort increases, PG&E may ultimately decide to reconstruct or replace a well.” In the event that poor water quality is encountered in water generated from well maintenance (e.g., presence of scaling ions, low or high pH, high suspended solids), Table 2.2-1 of the Contingency Plan (O&M Manual Volume 3) has identified mitigation measures for these contingencies in design and operations. See also response to comment #757 DTSC-239.	Okay pending review of the 90% design.			Comment resolved.	O&M Contingency Plan (Volume 3 of the O&M Manual), Appendix A.
464	DTSC-141	Appendix F Figure F-2 Page F-17	Conditioning Process Schematic	Please provide the disposition of the waste stream for the water from the dewatering phase.	See response to comment #217 DTSC-91, and drawing G-12-01 (Appendix D-2).	Okay.			Comment resolved.	90% BOD Appendix F Figure F-2.
465	DOI-170	Appendix F, Page F-17	References	The following item is included in the Reference list but is not referenced in the text: CH2M HILL 2009.	DOI is correct. However, revising a previously published document for the sole purpose of updating a reference list is not warranted, therefore, no changes are proposed to Appendix F.		Comment resolved.		Comment resolved.	Not applicable
Specific Comments – Appendix G (Evaluation of Arched Bridge Integrity and Space Availability to Support Freshwater Supply Pipeline)										
466a	FMIT-142	Append G		This appendix consists of 2 separate evaluations, one by EPNG and one by AECOM. A comparison of the two reports may be warranted. The former does not consider wind or seismic loading, whereas the latter does. The former doesn’t consider loading due to gas pipe hydrostatic pressure testing, whereas the latter does. Does PG&E still consider the EPNG report relevant?	PG&E conducted its own evaluation and recommended modifications of select structural members for compliance with current wind/horizontal loading requirements. PG&E Gas Transmission, as the entity responsible for the pipe bridge within PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the arched bridge. Any follow-on pipeline bridge improvement project			Comment resolved pending review of the 90% design.	Comment resolved.	Not applicable

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					will be a Gas Transmission project. Consistent with current practice, PG&E will keep the agencies, stakeholders, and Tribes informed of Gas Transmission projects in the Topock area.					
466b	Hualapai-115 Chemehuevi-115 Cocopah-115 CRIT-115	Append G		This appendix consists of 2 separate evaluations, one by EPNG and one by AECOM. A comparison of the two reports may be warranted. The former doesn't consider wind or seismic loading, whereas the latter does. The former doesn't consider loading due to gas pipe hydrostatic pressure testing, whereas the latter does. We are not sure if the EPNG report is even relevant.	See response to comment #466a FMIT-142.			Comment resolved pending review of the 90% design.	Comment resolved.	Not applicable
467	DOI-171	Appendix G, Topock Bridge (Old Trails Bridge) Assessment, Page 5 of 5	References	The following items are included in the Reference list but are not referenced in the text: National Park Service; Kulicki, John; El Paso Gas Company; Elnashai, Amr; and Structural Engineers Associates.	Comment noted.		Comment resolved.		Comment resolved.	Not applicable
468	FMIT-143 Hualapai-116 Chemehuevi-116 Cocopah-116 CRIT-116	Append G AECOM report		Rather than assuming a steel strength of 36,000 lb/square inch (AECOM report), it would be best to establish steel strength based on field measurements (stress-strain microprobe, or another method) or lab measurements.	PG&E Gas Transmission, as the entity responsible for the pipe bridge within PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the arched bridge. Any follow-on pipeline bridge improvement project will be a Gas Transmission project. PG&E appreciates the Tribes' inputs.			Comment resolved pending review of the 90% design.	Comment resolved.	Not applicable
469a	FMIT-144	Append G		Is scour at all a concern for the abutment on the ~~Arizona~~ California side? Please discuss why or why not.	The Arched bridge has been in service for almost 100 years. There has not been any problem with scour in that time. There is insufficient evidence that a problem exists to warrant study of this issue.			Comment resolved pending review of the 90% design.	Comment resolved.	Not applicable
469b	Hualapai-117 Chemehuevi-117 Cocopah-117 CRIT-117	Append G		Is scour at all a concern for the abutment on the Arizona side?	See response to comment #469a FMIT-144.			Comment resolved pending review of the 90% design.	Comment resolved.	Not applicable
470	FMIT-145 Hualapai-118 Chemehuevi-118 Cocopah-118 CRIT-118	Append G AECOM report Sect. 5.3		In section 5.3 of the AECOM report, there is discussion of analysis of bridge response under the condition when a single (presumably) gas pipe is being hydrostatically pressure tested with water. For that test, wind loads were reduced. By how much and why? Does a water-filled 30-inch-diameter gas pipe really not	During the hydrotesting, the wind velocity should not exceed 30mph per page 3, paragraph 2.3. Pressure testing procedure takes about 8 hours and weather forecast will be consulted for wind. Higher wind will cause overstress in some members. AECOM did not perform an existing			The Tribes strike the first question of the second part of the comment "Does a water-filled 30- inch-diameter gas pipe really not place significant load on the bridge compared to a water-filled 12- inch-diameter water line?"	Comment resolved.	Not applicable

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				place significant load on the bridge compared to a water-filled 12- inch-diameter water line? Also, why is there no reference analysis provided for the bridge in its existing condition?	conditions as a reference analysis.			Comment resolved.		
471	FMIT-146 Hualapai-119 Chemehuevi-119 Cocopah-119 CRIT-119	Append G AECOM report Sect. 6.0		In section 6.0 (Conclusions) of the AECOM report, reference is made to a section 7.0, said to contain recommended modifications. There appears to be no section 7.0.	See attached Drawing #481620, Change #1 (Erection Plan, Colorado River Highway Bridge Topock-Milpitas Main 300) for recommended modifications for compliance with current wind/horizontal loading requirements (included in **Attachment K**, at the end of this table). This drawing will be added to the report as Section 7. PG&E Gas Transmission, as the entity responsible for the pipe bridge within PG&E organization, is leading the discussion with Kinder Morgan regarding modifications to the arched bridge. Any follow-on pipeline bridge improvement project will be a Gas Transmission project. Consistent with current practice, PG&E will keep the agencies, stakeholders, and Tribes informed of Gas Transmission projects in the Topock area.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Appendix G.
Specific Comments – Appendix H (Updated Cost Estimate)										
472	FMIT-147	General		The first paragraph is unclear about whether PG&E is asserting that the remedy cost increase is attributable to addressing stakeholder comments. Please clarify and explain the relevance of this assertion if the cost increase was otherwise required to comply with ARARs or other statutory requirements. Also, please explain on page 10 of the estimate why certain mitigation measures are excluded from the estimates.	Cost increase is primarily attributable to more engineering detail and changes between the 30% and the 60% designs. Some of the changes are in response to stakeholder (including agency) comments, for example the addition of As/F pre-treatment facility. Specific cost increases (or decreases) can be found in Table H-1, with text explanations in Table H-2. As detailed in those tables some of the larger cost increases include: • Monitoring wells: The monitoring well network was modified which resulted in larger and deeper wells. A pre-drilling field program and expanded testing was added. In addition, well construction materials changed to more expensive material. • Arsenic/fluoride treatment plant: Construction and			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Appendix H.

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					operation/maintenance were added due to concerns about water quality in the HNWR-1 well. An alternative to treatment is still under consideration, but DTSC directed that treatment of parameters above CA MCLs be included in the 60% design. • Power source: Specifics were added regarding the source and distribution of power for the operation of the remedy as information became available. • Certain mitigation measures (listed in Appendix H) were excluded from the 60% design cost estimate for various reasons, including judgment that the costs were minimal relative to overall project costs (disturbance coordinator, tribal access plan), or because these items were not estimable at the time (TRC), or because the costs are embedded within design and operation (noise mitigation). Certain costs that were not estimable at the time of the 60% design, may be estimable at 90% design, and, if so, will then be included in the cost estimate. Text will be added to the 90% design to clarify that the changes in cost estimates are based on various factors including technical, stakeholder, and agency inputs.					
473	MWD-16	Appendix H/ Table H-1	Construction Cost Estimate	Construction cost of As/F Freshwater treatment is estimated at $9.5 million (nearly 9% of overall construction cost). Does the estimated O&M cost ($6.8 million per year) in Attachment C Table 1 include O&M costs for the pre-injection treatment system, including chemical costs?	The estimated annual O&M cost for the pre-injection treatment system for arsenic and fluoride in Attachment C Table 1 (page 3397 of the 60% BOD) is $1.16M. The estimated cost included chemicals as well as labor, maintenance, and materials.				Comment resolved.	90% BOD Appendix H.
474	DOI-172	Appendix H, Attachment A, Page 2	General Project Description	The in-text citation for DTSC 1996 is not listed in the Reference section.	Noted. Will include in the 90% design submittal.		Comment resolved.		Comment resolved.	90% BOD Appendix H.
475	DOI-173	Appendix H, Attachment A, Page 2	General Project Description	The in-text citation for DOI, 2005 is not listed in the Reference section.	Noted. Will include in the 90% design submittal.		Comment resolved.		Comment resolved.	90% BOD Appendix H.
476	DOI-174	Appendix H, Attachment A,	Estimate Classification	Please change the in-text citation for “2009 CH2M HILL” to “CH2M HILL 2009”.	Noted. Will include in the 90% design submittal.		Comment resolved.		Comment resolved.	90% BOD Appendix H.

TABLE I-1
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		Page 4								
477	DTSC-142	Appendix H, Cost Resources, 5th bullet	National Electrical Contractors Association – Labor Unit Manual and published list pricing discounted 30% for electrical materials	Please provide rationale on the 30% discount applied.	The 30% discount for electrical materials is based upon professional experience and conversations with vendors regarding discount for bulk purchase. Note that the 30% discount did not apply to any of the generation equipment.	DTSC discourages use of discount rates unless it is backed up by vendor estimates. Pursuant to EPA's guide for cost estimate (EPA 540-R-00-002 OSWER 9355.0-75), "If possible, more than one vendor quote should be obtained. Quotes from multiple sources can be averaged, or the highest quote can be used in the cost estimate if the collected quotes seem to be at the low end of the industry range."			DTSC's input are noted for the 90% cost estimate.	90% BOD Appendix H.
478	DTSC-143	Appendix H, Major Assumptions, p.6	HDPE pipe installation and fusing will be done at night for the next day of work.	This is contrary to PG&E's design statements that night work is not anticipated. Please explain.	Pipe installation will be done during daytime hours. Pipe fusing can be done at night and to do so could significantly reduce the construction schedule. If such work is proposed for the night time, PG&E will take all possible steps to reduce lighting (shrouding and shielding temporary lights) and duration. All night time work will be performed in compliance with the approved mitigation measures.	If this is PG&E's plan, it is recommended that all statements associated with night work are consistent within the design document.			Comment resolved.	90% BOD Appendix H.
479	DTSC-144	Appendix H, Major Assumptions, p.7	Startup is 6 weeks.	Please define start up and how this effects costs.	The startup task entails pre-commissioning and commissioning tasks for the Remedy system. Pre-commissioning includes confirming all electrical, mechanical, and controls equipment are installed properly so that the system is accepted as complete following construction and startup can be begin. Equipment testing during this phase includes such things as motor rotation tests, control loop checks, and valve actuation. Any defects found during this phase will be corrected and checked prior to accepting the system. Commissioning includes testing the entire system on both a subsystem level (e.g., individual well or carbon dosing system) and the entire system to verify operational sequences and alarms work properly using clean water to the maximum extent possible. Any system defects are repaired and checked prior to accepting the commissioning phase. A testing phase using contaminated	Comment resolved pending review of the 90% design.			Comment resolved.	90% BOD Appendix H.

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					groundwater, known as groundwater commissioning, would normally be the next step, but this step was not included in the estimate as the procedures had not been defined for the 60 percent design. Once a groundwater commissioning procedure is prepared (start-up procedures will be included in the 90% design) this step can be estimated. The time of six weeks is based upon the best estimate of time at the 60% design stage. The quality of the engineering/ specifications with input from the owner with incorporation of the owner input and design requirements into a comprehensive QA program will determine the true time and cost of startup. Price impacts are based upon how the risk is contractually distributed among the various vendors and subcontractors. For instance, if startup and testing is a time and materials/expense activity, cost will increase if the startup time exceeds six weeks. If startup time is based upon a lump sum performance based scope of work, the cost may remain the same. The time and pricing implications can be better examined when the class 1 estimate is priced because the design plan set and specifications will be more definitive (i.e., complete design, functional description, schedule).					
480	DTSC-145	Appendix H, Description of Construction Work	Process trench spoil, assuming 100% will be used as bedding/backfil l	Did estimate take into consideration the large volume of soil that may require storage, care and maintenance for an extended period of time? What cost assumptions were used for the soil?	Not enough information regarding the anticipated volumes, storage locations, and details regarding maintenance protocols for excess soil was available at the time of the 60% design cost estimate. Therefore, it was assumed that all of the soil generated would be re-used on-site. This information will be updated in the 90% design cost estimate. DTSC's input are noted for 90% cost estimate.	PG&E is currently considering specific locations for soil storage from the construction phase of the project. Cost estimate should be consistent with PG&E's proposal for the quantity of soil estimated for storage.			Comment resolved.	90% BOD Appendix H.
481	DTSC-146	Appendix H, Excluded Costs		Why did PG&E exclude these costs, especially mitigation measures that will be required for the life of the project?	See response to comment #472 FMIT-147. DTSC's input are noted for 90% cost estimate.	DTSC would like to see a rationale for each item that is excluded from the cost estimate in the 90% design. Please note that all costs, even			Comment resolved.	90% BOD Appendix H.

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						minimal costs should be included.				
482	DOI-175	Appendix H, Attachment C, Page 2	References	The following item is included in the Reference list but is not referenced in the text: CH2M Hill 2011.	Noted. Will include in the 90% design submittal.		Comment resolved.		Comment resolved.	90% BOD Appendix H.
483	DTSC-147	Appendix H, Attachment C, Table 1	Arsenic and Fluoride Treatment Plant – Comment: Facility O&M and assumes minimal waste need to be transported off-site	According to PG&E's Sustainability Summary Metrics of 3/29/2013, PG&E estimated Liquid Waste Truck Trips to range from low of 500 truck trips to high of 1,833 trips for AA technology. See also comment on Appendix M, 4.0 Summary of Ongoing Bench-scale Testing Results, Wastewater Generation, Page 4 below. Please explain why this assumption is used for cost estimate.	The reference text assumes the wastewater could be managed using a range of management options similar to those identified for remedy produced water. The assumption was made based on preliminary bench testing results. Note that PG&E will remove the arsenic and fluoride treatment system, and include an arsenic only freshwater pre-injection treatment system, in the 90% design as a contingency.	PG&E's response suggests that the Sustainability Summary Metrics as published is misleading since the design document considered another set of management options. The cost estimate must consider the higher of the range of options that are consistent with the design. PG&E cannot publish in a summary metric of needing up to 1833 truck trips and yet not consider it for cost estimate. DTSC understands that the 90% design will contain different technology and that the cost estimate will be updated.			Comment and response noted.	90% BOD Appendix H.
Specific Comments – Appendix I (Response to Comments on Draft 30% BOD Report)										
484	DOI-176	Appendix I	General Comment	The references in this Appendix need to be reviewed, as there seems to be some in-text citations missing, as well as some discrepancies with the corresponding References list.	Comment noted. Cross references will be verified.		Comment resolved.		Comment resolved.	This Appendix.
485	FMIT-148	General		Where the final two columns (final comment resolution and where responses are reflected in the BOD report) are blank, how is the reader to interpret the status of the comment? For example, is it being carried forward to the final design document for resolution? Is there any schedule for resolution, either by date or program event? Also, some of the Final Comment Resolution Boxes do not appear to "match" the DTSC or DOI responses to the 30 % design comment (i.e., Item 303). This makes the tracking of comments difficult and the matrix of limited utility. How will this be resolved in the final design documents?	In that case, it means that the comment has been resolved and there is no need for modify the cited text/tables/ figures in the next iteration of the BOD. For the 90% BOD, in such case, PG&E proposes to put "Comment Resolved" under the Final Comment Resolution column and "Not Applicable" under the "Where responses are reflected in the BOD report" column. PG&E welcome suggestions from the Tribe to assist with its tracking of the comments and use of the matrix.			Comment resolved.	Comment resolved.	90% BOD Appendix I.
486	FMIT-149	Items 25 & 183		By letter dated March 15, 2012, to DTSC and DOI, the Tribe communicated that its legal counsel had not provided any non-confidential communications to PG&E	PG&E fully responded to all of the Tribe's comments on the 30% BOD (See Appendix I in the Intermediate Basis of Design Document.) When responding to the Tribe's comments,				PG&E and the FMIT have discussed this comment and the response.	Not applicable

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				on the 30% BOD and did not authorize PG&E to communicate or represent the Tribe's position in any regard. This should be noted in respect to PG&E's responses on these and other items in the 30% BOD. Please refer to and incorporate the Tribe's position on Items 25 and 183 as they are set forth in that letter.	PG&E did not in any way indicate that its response to the Tribe represented the Tribe's position. PG&E's responses to comments represent PG&E's understanding and good faith effort to answer comments. PG&E continues to understand based on the Tribe's May 15, 2012 letter to DTSC and DOI (the comment appears to have the wrong date) that the Tribe's comments regarding the East Ravine area and electrical transformers were not intended "to criticize the completeness of the FEIR nor to request additional mitigation measures." (Letter from the Tribe to DTSC and DOI (May 15, 2012) at p. 5). Accordingly, PG&E's response that the Tribe's comments on items 25 and 183 references to mitigation measures refers to measures from the EIR and does not need to be amended.					
487	FMIT-150	Item 27		PG&E's response/the intermediate BOD narrative does not respond to DOI's comment. Also, the Tribe believes it is disrespectful for PG&E to try and place modern development in the same paragraph and same context as the Tribe's religious and cultural history/values. These should be separated in the final BOD. Also, please strike statement that Tribe "considers" the area sacred; the area IS sacred to the Tribe. Finally, did the language that was struck at the end (what appear to be general project protocols to minimize impacts) get moved elsewhere and if so where?	**<u>Proposed revision to the RTC is below in bold/underlined:</u>** DOI's comment recommended that Section 1.1 "be revised to discuss project history and a new section or subsection be added to address the cultural significance, cultural and historic resources and ecological resources, including the ACEC and the HNWR." PG&E's response to this comment and its revisions reflected in the 60% BOD directly address DOI's comment by adding further information regarding project history to Section 1.1. "Background" and by adding subsections further addressing Cultural and Historic Resources and Ecological Resources. In response to the FMIT's request that discussion of modern development be separated from the Tribe's religious and cultural history/ values. PG&E will include the discussion of the historic-era features and archaeological resources in a separate paragraph from the discussion of the Topock Maze. Text will be changed as follows: "[t]he Topock site and adjacent lands are contained within a larger			The FMIT requests that the stricken language be inserted into the 90% BOD.	PG&E and the FMIT have discussed this comment and the response. PG&E is awaiting a response from the FMIT on the text options that PG&E presented.	90% BOD Executive Summary. 90% BOD Section 1.1.1.

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					geographic area that is ~~considered~~ sacred to ~~by~~ the Fort Mojave Indian Tribe and to ~~by~~ other Native American Tribes." **<u>PG&E proposes either of the following sentences in lieu of the above revision:</u>** **<u>"The APE for the Topock site is contained within what the FMIT and other Native American Tribes have identified as a larger area of traditional and cultural importance."</u>** **<u>OR</u>** **<u>"The Tribes have stated that the APE is contained within a larger geographic area that is sacred to the FMIT and other Native American Tribes."</u>** Finally, the language that was stricken at the end of Section 1.1 (in response to 30% design comments #27 DOI-13 and #30 HA-3c) was not moved elsewhere, instead it was replaced with language stating that impacts to cultural resources will be minimized by implementing mitigation measures in the EIR, PA and CHPMP, and in consultation with the Tribes throughout the design process.					
488	FMIT-151	Item 27		PG&E's response/the intermediate BOD narrative does not respond to DOI's comment. Also, the Tribe believes it is disrespectful for PG&E to try and place modern development in the same paragraph and same context as the Tribe's religious and cultural history/values. These should be separated in the final BOD. Also, please strike statement that Tribe "considers" the area sacred; the area IS sacred to the Tribe. Finally, did the language that was struck at the end (what appear to be general project protocols to minimize impacts) get moved elsewhere and if so where?	The FMIT has confirmed that comment FMIT-151 is duplicative of comment FMIT-150. See response to comment #487 FMIT-150.				Comment resolved.	Not applicable
489	FMIT-152	Item 53		The Tribe is concerned about DTSC's statement that it "continues to be concerned with the efficacy of the remedy." It seems to the Tribe that DTSC has approved this particular remedy and would be surprised if DTSC would approve a remedy it did	PG&E defers to DTSC.	DTSC's statement is in regards to the acknowledgement of the complexity of the proposed remedy in context to the sensitivity of the surrounding landscape. The technology presented is sound,		Review in progress.	This comment and responses were discussed at the December 17-18, 2013 TWG meeting.	Not applicable

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				not think would work or be effective. What does this statement mean to DTSC?		however, there are constraints that would limit PG&E's ability to refine the remedy, or respond as they would in a typical remedial enhancement; for example, installing additional injection wells in response to recalcitrant areas. Nevertheless, as included in the original statement, "PG&E has been able to provide reasonable logic to all concerns raised. DTSC will continue to carefully evaluate and monitor PG&E's proposal throughout the design, construction and implementation process."				
490	FMIT-153	Item 63		Is PG&E's proposal to incorporate possible use of an infiltration gallery in Bat Cave Wash into the soil RFI/RI Work Plan mean that potential aspects of the groundwater remedy are now being proposed to be combined with the soil remedy? What are the potential CEQA ramifications of this? Please note that the Tribe objects to such an infiltration gallery in this especially culturally sensitive area.	As stated in the response to comment #72a FMIT-21, the concept of an infiltration gallery in Bat Cave Wash was included in the design documents as an option to manage remedy-produced water. This option is not being further evaluated in the design at this time. If PG&E proposes to evaluate this option further in the future, PG&E will discuss the option at that time, and will seek further input from the Tribes during the Soil CMS/FS development and review. Text will be added to the 90% BOD to reflect this response.			Comment resolved.	Comment resolved.	90% BOD, Footnote to Exhibit 3.4-2 90% BOD, Appendix F, Footnote to Table F-5
491	FMIT-154	Item 65		Why would the 20-foot setback requirement not apply to the Arizona remedy infrastructure? Why would the rationale for such requirements differ on each side of the River?	PG&E defers to DTSC as the 20-foot setback requirement is set forth in the EIR mitigation measure AES-2a.	DTSC's understanding of PG&E's response to the referenced comment is that there will not be any substantial vegetation removal along the riverbank for any infrastructure proposed in the Arizona side of the river. Therefore, set back in Arizona side of the river is not applicable based on current design.		Response noted.	Noted.	Not applicable
492	FMIT-155	Item 71		The Tribe appreciates DOI's response that additional consultation "provides the framework needed to address cultural values of religious and spiritual significance." The Tribe would like DOI to provide it with a timeframe for that consultation that	PG&E defers to DOI.		BLM has conducted formal Section 106 consultation with the Tribes early in the remedial design process on both the 30% and 60% design documents	Response noted.	Noted.	Not applicable

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				will be adequate to the need and not push that important and long-awaited consultation to the very end of remedy design or when insufficient time will remain for those necessary discussions.			and will consult on the 90% design documents when they become available. DOI and BLM have had several formal, face-to-face consultation meetings with the Tribes on the CHPMP (bi-monthly), the 30% design documents (March 8, 2012) and 60% design documents (May 23rd 2013 & July 9, 2013) as well informal discussions at the TWG meetings. We will continue to engage in consultation on the design throughout the remainder of the resolution and review of the 90% design package. DOI will continue to coordinate as much as possible with the tribes to allow for sufficient time for consultation.			
493	FMIT-156	Item 119		The Tribe feels that PG&E's generalized comment is not fully responsive. The Tribe would like to understand the specifics of where cultural resource constraints may affect design and operation. As noted elsewhere, the Tribe also would like to understand the different design options relative to tribal cultural resources.	Section 6 of the 60% BOD (Table 6.1-1) presents a summary of actions taken or being performed under each EIR mitigation measure, which includes specific examples of how the 60% design incorporated cultural considerations and Tribal inputs, e.g., the use of field reviews in siting infrastructures, eliminating the BCW trenching, relocating wells in the upland, and reducing the number of transformers/ siting transformers aboveground. More recent examples of how cultural resources consideration was incorporated into the design are: 1) the relocation of monitoring well I in the uplands to a location further away from cultural resources, 2) the proposed relocation of certain provisional IRZ wells and associated infrastructure from the west side to the east side of NTH at the request of the Tribes, and 3) the current evaluation of relocating well IRL-2 closer to the road. Regarding alternative design options, please see response to comment #1 DOI-1 for aboveground vs.			Comment resolved. Please provide similar examples moving forward.	Comment resolved.	Table 6.1-1 of the 90% BOD includes specific examples of how the 90% design incorporated cultural considerations and Tribal inputs, e.g., CUL-1a-10. 90% BOD Executive Sumamry Section ES.3, last paragraph, contains examples of actions taken to avoid new remedy infrastructure on the FMIT parcel.

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					belowground piping design.					
494	FMIT-157	Item 125		The statement that PG&E will adhere to any “agreements” made regarding well and system decommissioning appears to ignore that DTSC has the power to direct and require action by PG&E.	Noted. PG&E recognizes that DTSC and DOI are primary approval authorities for the project and can direct/ require action by PG&E.			Comment resolved.	Comment resolved.	Not applicable
495	FMIT-158	Item 205		The Tribe appreciates DOI’s response that the federal agencies are evaluating potential options for use restrictions for property under its jurisdiction. The Tribe requests DOI to consult with it on such options.	PG&E defers to DOI.		The Tribal Access Plan will remain in place to assure the Tribes of continued access to federal lands contained within the boundary of the APE. If necessary, development of further land use restrictions would be implemented by the bureaus within their specific management plans, and these planning processes typically include tribal consultation. The language from the Record of Decision for the groundwater remedy clearly states that "Institutional controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of a cleanup action or result in unacceptable human exposure to hazardous substances remaining at a site. Such measures are adopted to assure the continued protection of human health. The institutional controls adopted by the Selected Remedy for the Site are specified in the *BLM Lake Havasu Field Office Resource Management Plan* issued in May 2007 and in the *1994 Lower Colorado River National Wildlife Refuges Comprehensive Management Plan.* These plans restrict surface uses and use of			Not applicable

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							the groundwater. Institutional controls will remain in place for the duration of the remedy until RAOs are achieved."			
Specific Comments – Appendix J (Freshwater Supply Technical Memorandum and Response to Comments)										
496	FMIT-159	General Comment		The Tribe submitted comments on earlier versions of the FWIP. These should be addressed along with DTSC's and DOI's comments.	PG&E had provided responses to all comments received on the FWIP (2013) prior to finalizing the work plan. These responses are documented in Attachment A of the FWIP. Additional comments were received from FMIT on the Final FWIP, and those were reviewed by DTSC/DOI prior to FWIP implementation. In addition, PG&E also provided responses to all comments received on the Freshwater Supply Technical Memo (2012), these are documented in Appendix J of the 60% BOD.			Comment resolved.	Comment resolved.	Not applicable
497	FMIT-160	DTSC Comment 10		PG&E states that it purchased water from the owners of the Topock 2 and 3 wells. Were there any other users or purchasers of water from these wells during the time period referenced in the comment? Does PG&E still buy water from this source and if so, for what purpose?	These wells are currently owned by the Southwest Water Company. The wells were previously owned by the City of Needles and by Burlington Northern Santa Fe Railroad. PG&E continues to purchase water from these wells for industrial uses at the Topock Compressor Station. PG&E is aware that the Topock Marina facility used water from these wells prior to its demolition a few years ago, but does not have any further information about other users or purchasers.			Comment resolved.	Comment resolved.	Not applicable
498	DOI-177	Appendix J, Section 2.2.2, Page 4	Total Dissolved Solids	The in-text citation for RWQCB 2006 is not listed in the Reference section.	The in-text citation for RWQCB 2006 is the *"Water Quality Control Plan, Colorado River Basin Region 7 (includes Amendments Adopted by the Regional Board through June 2006)"*.		Comment resolved.		Comment resolved.	Not applicable
499	DOI-178	Appendix J, Section 3.2.2, Pages 9 and 10		The in-text citations to the LeRoy Crandall and Associates source are "Crandall". Should the citations be revised to "Crandall & Associates"?	This is an editorial preference. Editing/ modification of a previously published report (outside of the BOD) to solely update a citation convention is not warranted.		Comment resolved.		Comment resolved.	Not applicable
500	DOI-179	Appendix J, Section 3.2.2, Pages 10		The in-text citation for Metzger and Loeltz 1973 is not listed in the Reference section.	This in-text citation is listed in the Reference section (Section 9) of the 60% BOD, please see page 9-4, it is the 8th reference from the top.		Comment resolved.		Comment resolved.	Not applicable
501	DOI-180	Appendix J,		The in-text citations to the LeRoy Crandall and Associates source are	See response to comment #495 DOI-178.		Comment resolved.		Comment resolved.	Not applicable

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		Section 3.3.2, Pages 19 through 21		"Crandall". Should the citations be revised to "Crandall & Associates"?						
502	DOI-181	Appendix J, Table 3-1, Page 2 of 3	Notes	The in-text citations to the LeRoy Crandall and Associates source are "Crandall". Should the citations be revised to "Crandall & Associates"?	See response to comment #495 DOI-178.		Comment resolved.		Comment resolved.	Not applicable
503	DOI-182	Appendix J, Response to Comments, Page J-16	Comment Number 12	In-text citations for CH2M HILL 2012g and CH2M HILL 2013a are not listed in the Reference section.	These in-text citations are listed in the Reference section (Section 9) of the 60% BOD, please see page 9-3, they are the 14th and 15th references from the top, respectively.		Comment resolved.		Comment resolved.	Not applicable
504	DOI-183	Appendix J, Response to Comments, Page J-18	Comment Number 15	The in-text citation for CH2M HILL 2013a is not listed in the Reference section.	See response to comment #499 DOI-182.		Comment resolved.		Comment resolved.	Not applicable
505	DOI-184	Appendix J, Response to Comments, Page J-23	Comment Number 33	The in-text citation for CH2M HILL 2012f is not listed in the Reference section.	This in-text citation is listed in the Reference section (Section 9) of the 60% BOD, please see page 9-3, it is the 13th reference from the top.		Comment resolved.		Comment resolved.	Not applicable
Specific Comments – Appendix K (Revised East Ravine Groundwater Investigation Addendum)										
506	DOI-185	Appendix K, Executive Summary, Summary of Key Findings, Refined understanding of hydrogeology, Page 1	"The depth to bedrock beneath the TCS was found to be deeper than previously estimated, which indicates a larger area of saturated alluvium in this area than previously estimated."	Since aquifer thickness has increased, how does this impact the current groundwater remedial program (e.g., well screening zones, water volumes, capture zone, pumping rates, etc.)?			At the time of the 60% design, DOI had not completed their review of the ER-TCS Addendum. DOI recommends that ER-TCS addendum comments in the 60% design be deferred to comment resolution on the ER-TCS Addendum.		Comment deferred to comment resolution on the ER-TCS addendum.	See Table F-1 of the *Revised Addendum to the Summary of Findings Associated with the East Ravine Groundwater Investigation*
507	DOI-186	Appendix K, Section 2.5, Page 9	"The depth-specific samples were collected using a wireline straddle packer tool to isolate fractures in the interval of interest."	Please identify the intervals of interest.			See DOI's note in row above.		Comment deferred to comment resolution on the ER-TCS addendum.	See Table F-1 of the *Revised Addendum to the Summary of Findings Associated with the East Ravine Groundwater Investigation*

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508	DOI-187	Appendix K, Section 3.2, Page 12	"Depth-specific grab samples were collected from the two primary flow zones using packers."	Are the two primary flow zones found at 148-168 feet and 195 feet? If so, this information should be stated parenthetically at the end of the sentence.			See DOI's note in row above.		Comment deferred to comment resolution on the ER-TCS addendum.	See Table F-1 of the *Revised Addendum to the Summary of Findings Associated with the East Ravine Groundwater Investigation*
509	DOI-188	Appendix K, Section 3.6.1, Page 19	"The drawdown caused by pumping was too small to observe directly in any but the closet well, MW-70-105 9 shallower well pair to the pumping well), where the well exhibited a consistent dewatering trend and a total of 1.6 feet of drawdown . . . "	What is the distance from the pumping well to well MWE-70-105?			See DOI's note in row above.		Comment deferred to comment resolution on the ER-TCS addendum.	See Table F-1 of the *Revised Addendum to the Summary of Findings Associated with the East Ravine Groundwater Investigation*
510	DOI-189	Appendix K, Section 3.6.2, Page 19		Please identify the range of specific capacity measurements so readers can better understand the specific capacity estimates without having to refer to data located elsewhere in the document.			See DOI's note in row above.		Comment deferred to comment resolution on the ER-TCS addendum.	See Table F-1 of the *Revised Addendum to the Summary of Findings Associated with the East Ravine Groundwater Investigation*
Specific Comments – Appendix L (Draft Operations and Maintenance Manual)										
511	DOI-190	Section L1.1.2, Page L1-2	"In addition, a summary of compliance with applicable Programmatic Agreement (PA) stipulations and Cultural and Historic Properties Management Plan (CHPMP) provisions are included in Tables L1.1-3 and L1.1-4, respectively."	It should be noted that additional CHPMP measures may be identified during ongoing consultation meetings with the Tribes, and the CHPMP will be modified accordingly.	Comment noted.		Comment resolved.		Comment resolved.	Not applicable
512	DOI-191	Table L1.1-1,	"Plans and	When will these specifications be	The specifications will be made		Comment resolved		Comment resolved.	See the *Habitat Restoration Plan*

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		Mitigation Number AES-1b, Page L1-5	specifications for revegetation shall be developed by a qualified plant ecologist or biologist before any riparian vegetation is disturbed and shall be implemented consistent with CUL1a-5.”	made available for review?	available for review with submittal of a revegetation plan for impacts to riparian vegetation, at 90% design.		pending review of 90% design.			*for Riparian Vegetation and Other Sensitive Habitats*, which is included in an appendix to the Construction/Remedial Action Work Plan.
513	DOI-192	Table L1.1-1, Mitigation Number AES-1e, Page L1-5	“e) The final revegetation plans and specifications shall be reviewed and approved by an architect, landscape architect, or allied design professional licensed in the State of California . . .”	It is important to ensure that the qualified person is familiar with native desert flora, with experience (and success) in desert restoration. The selected professional should have qualifications and experience with desert landscape and revegetation needs, as well as an associated maintenance background, in order to ensure success of the program. Additionally, the plan must be reviewed and approved by FWS biologist or botanist and the PG&E biologist.	Comment noted. A botanist with expertise in desert flora and experience designing revegetation plans in arid areas will prepare the revegetation plan which will be approved by the PG&E biologist. A Certified Landscape Architect professionally licensed in the State of California with experienced in desert landscape and revegetation requirements will also review the revegetation plans. Draft plans will be submitted for USFWS review at 90% design.		Comment resolved pending review of 90% design.		Comment resolved.	The *Habitat Restoration Plan for Riparian Vegetation and Other Sensitive Habitats* (included as an appendix to the Construction/ Remedial Action Work Plan) was prepared by CH2M HILL biologist Steve Long and E2 botanist Russ Huddleston, and reviewed and approved by PG&E biologist Virginia Strohl and CH2M HILL Landscape Architect Linda Cyra-Korsgaard (licensed in California). All of these named individuals have expertise in desert flora and experience designing revergetation plans in arid areas.
514	DOI-193	Table L1.1-1, AES-1a, Page L1-5		The citation for this section is CH2M HILL 2012a; however, the reference section includes two CH2M HILL references – CH2M HILL 2012 and CH2M HILL 2012f.	The citation 2012b will be revised to 2012.		Comment resolved.		Comment resolved.	Not applicable as this reference is no longer in the O&M Manual Section L5
515	DOI-194	Table L1.1-1, AES-2a, Page L1-6		The in-text reference is CH2M HILL 2011d; however, the reference page has 2011a, b, c, and k. CH2M HILL 2011k should be CH2M HILL d in the Reference list.	The citation 2011k will be revised to 2011d on the Reference List.		Comment resolved.		Comment resolved.	Not applicable as this reference is no longer in the O&M Manual Section L5
516	DOI-195	Table L1.1-1, Mitigation Number AES-2b, Page L1-6	“b) Existing mature plant specimens shall be protected in place during construction, operation, and decommissioning phases. The identification of plant specimens that are determined	As the project will take place over several decades, how frequently will the Mature Plant Survey be performed in order to update data and protect future mature plant species?	Mature plants will be surveyed as part of the pre-construction biological survey prior to any ground disturbance and prior to ground disturbing activities during operations and decommissioning and avoided as much as possible throughout implementation of the remedy.		Comment resolved.		Comment resolved.	Not applicable

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			to be mature and retained shall occur as part of the design phase and mapped/identified by a qualified plant ecologist . . . "							
517	DOI-196	Table L1.1-1, AES-2b, Page L1-6		The in-text reference is CH2M HILL 2012b; however, in the Reference list there is only 2012 and 2012f. Which should be designated as "a" and which as "b"?	See response to comment #514 DOI-193.		Comment resolved.		Comment resolved.	Not applicable as this reference is no longer in the O&M Manual Section L5
518	DOI-197	Table L1.1-1, BIO-3b, Page L1-12		The in-text reference is CH2M HILL 2012a; however, in the Reference list there is only 2012 and 2012f. Which should be designated as "a" and which as "b"?	Item 2012f on the Reference List will be revised to 2012a. No changes are needed to BIO-3b.		Comment resolved.		Comment resolved.	Not applicable as this reference is no longer in the O&M Manual Section L5
519	DOI-198	Table L1.1-1, Mitigation Number GEO-1a-a, Page L1-28	"a) A DTSC-approved grading and erosion control plan, prepared by a California Registered Civil Engineer, shall be completed . . . "	How often will the engineered control measures be inspected in the field to ensure that they are fully operational?	This information will be included in the plan for review.		Comment resolved pending review of 90% design.		Comment resolved.	Discussions regarding BMPs in the Construction/Remedial Action Work Plan Section 4 and appendix.
520	DOI-199	Table L1.1-4, Section 6.9, Page L1-73		The in-text reference is BLM et al. 2010; however, the reference list says 2011.	The subject in-text reference is actually part of the excerpt text lifted from the CHPMP. Therefore, it is not include in the reference list of this volume (Section L5).		Comment resolved.		Comment resolved.	Not applicable.
521	MWD-17	Appendix L, Draft O&M Manual, Section 2	Communication	Metropolitan/downstream users of the Colorado River should be included in receiving any communication that involves a potential threat to the river.	The following text will be added to Exhibit L2.2-3 (Preliminary Communication Framework), Party Receiving Communications column, for triggering events listed on page L2-6 only (other trigger events are not expected to pose a threat to the river): "<u>If there is a potential threat to the river, notify MWD and immediate downstream users such as the Chemehuevi Indian Tribe as soon as possible</u>."				Comment resolved.	O&M Manual Main Text Table L2.2-1.

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522	DOI-200	Exhibit L2.2-4, Page L2-9	2. Operations Summary	The report section should also include percentage of time treatment systems were operational on a monthly basis, quantity of water recovered for treatment, as well as cumulative total, quantity of ethanol injected, etc.	Comment noted. These parameters have been anticipated as operational and process monitoring data.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Main Text Exhibit L2.2-2. O&M Manual Volume 2 Exhibit 6.5-1.
523	DOI-201	Exhibit L2.2-4, Page L2-9	3. Performance Summary	The report section should also include volume of water collected and treated, Cr(VI) mass treated, influent-effluent data, etc.	Comment noted. The information listed in this comment will be included in Section 3 (Performance Summary) of the quarterly progress reports.		Comment resolved.		Comment resolved.	O&M Manual Exhibit L2.2-2. O&M Manual Volume 2 Exhibit 6.5-1.
524	DOI-202	Section L2.3, Page L2-12		Suggest adding OSHA training to this section.	The following text will be added at the end of the first paragraph under Section L2.3: "<u>In addition, all workers will be required to comply with the training requirements specified in the overall Project Health and Safety Plan</u> *[available at 90% design]* <u>and their own site-specific Health and Safety Plan specific to their operations on the project.</u>"		Comment resolved.		Comment resolved.	O&M Manual L2.3.
525	FMIT-161	Workers Training (L2.3)		Please confirm that cultural sensitivity training is required of PG&E's consultants before field work and report submittal.	This is confirmed.					Not applicable
526	FMIT-162	Work Variance Request Form: Exhibit L2.2.5		How will the Tribe be notified of variances to the project during project implementation?	As operation of the project proceeds, PG&E will continue to implement the adopted mitigation measures, which include multiple requirements for Tribe monitoring and outreach/ coordination with Tribes during project implementation, including the protocols for continued communication and tribal communication to be set forth in the CIMP that is required pursuant to Mitigation Measure CUL-1a-8.					O&M Manual Main Text Table L2.2-1.
527	DOI-203	Section L3.1, Offsite Laboratory Data, Page L3-1	"At a minimum, the laboratory will maintain the following records: . . . "	How long will the laboratory be required to maintain such records?	Laboratory records are normally retained for five years after the data are reported. However, in compliance with Section XXV of the CD (DOI 2013), PG&E will maintain such records for 10 years following receipt of certification of completion. At the conclusion of the record retention period, PG&E will notify DOI and DTSC in writing at least 90 days prior to the destruction of any records and will provide DOI and DTSC with the opportunity to take possession of any records. Text will be revised to add the		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Main Text Section L3.1.

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					duration of retention of records.					
528	DOI-204	Section L3.1, Maintenance/Calibration Records, Page L3-1	"Computerized maintenance management programs could be implemented at the facility, as appropriate, to keep track of maintenance requirements."	Will the "computerized maintenance management programs" have the capacity to send out reminders via email when a maintenance activity should be performed?	The maintenance management program will have the capacity to issue work orders for routine maintenance activities.		Comment resolved.		Comment resolved.	O&M Manual Main Text Section L3.1.
529	DTSC-148	Appendix L L3.1 Data Management Onsite Laboratory Data, Page L3-1	Certain testing for process control monitoring will be performed at an onsite laboratory in accordance with site specific SOPs.	Where are/will these SOPs be located (90%)? Please identify the location of SOPs as they are introduced so that they may be easily referenced and reviewed. A "hyperlink" is suggested in the electronic versions.	Available SOPs for onsite lab measurements have been provided for review in the 60% design submittal, please see Draft O&M Manual Volume 2 (Sampling and Monitoring Plan), Appendix A (SOPs). Additional SOPs may be available at the 90% design, the use of hyperlink will be explored for the 90% BOD.	Comment resolved pending review of the 90%.			Comment resolved.	O&M Manual Volume 2 Appendix A (SOPs). References to the appendix were added. The use of hyperlink was considered for the 90% BOD, and will need to be tested. Due to time constraint, PG&E will continue to test for potential implementation in the final design documents.
530	DTSC-149	Appendix L L3.1 Data Management, Page L3-2	Exhibit L3.1-1	Minor edit: It appears that "Offsite lab data was repeated twice in the figure balloons and omitted "Onsite lab data".	Comment noted. The second balloon will be revised to state "Onsite lab data".	Okay.			Comment resolved.	O&M Manual MainText Section L3.1.
531	DOI-205	Section L3.3, Page L3-3	"…progress reports will be submitted monthly during RA construction and quarterly after the remedy has been implemented and demonstrated to be operating as intended."	As start-up may require two years before the RA is operating as intended, will monthly progress reports be provide during this time period?	PG&E believes that quarterly progress reporting is adequate during remedy start-up because the amount of new information will not be generated at the same frequency or speed as during construction. In addition, PG&E will provide notifications of planned O&M activities (including sampling activities) via monthly emails, as indicated in Exhibit L2.2-3. In addition, PG&E will hold a regular monthly technical call during startup activities to include agencies and stakeholders.		Comment resolved.		Comment resolved.	Not applicable
532	DTSC-150	Appendix L L3.3 Reporting Page L3-3		Add to this section to indicate that agencies may require additional reporting requirements as the remedy progresses.	The following text will be added to Section L3.3: "<u>It is noted that the agencies may request additional information, or reports as the remedy progresses</u>."	Okay.			Comment resolved.	O&M Manual Main Text Section L3.3.
533	DOI-206	Section 5, Pages L5-1 and L5-2		The following are on the Reference list but are not referenced in the text: CH2M HILL 2011k, CH2M HILL 2012f, and CH2M HILL 2012. Should these items be removed from the Reference list?	See response to comments #515 DOI-194 and #519 DOI-197: Item 2011k will be revised to 2011d and Item 2012f will be revised to 2012a. No changes are proposed for Item 2012.		Resolved.		Comment resolved.	O&M Manual Main Text Section L5.

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Specific Comments – Appendix L – Volume 1: Operations and Maintenance Manual										
534	DOI-207	Volume 1	General Comment	Without detailed SOPs and equipment O&M Manuals, the O&M Plan is more of an overview of operations. It is understood that these documents will be provided in the 90% Design.	Comment noted. PG&E looks forward to inputs from and discussions with the agencies, Tribes, and stakeholders on the information presented in the Draft O&M Plan, as that will inform and shape the details that are forthcoming in the 90% design.		Comment resolved.		Comment resolved.	Detailed SOPs are included in Appendix B of O&M Manual Volume 1 and Appendix A of O&M Manual Volume 2. Select equipment manuals are included in Appendix A of O&M Manual Volume 1.
535	DOI-208	Volume 1	General Comment	Will all pumps and valves be labeled with ID numbers in the field, thereby allowing operators to cross reference information and drawings within the O&M manual to equipment in the field?	Yes. The following text will be added to the second paragraph in Section 2.0: "<u>All pumps and valves will have steel identification tags attached to the device to enable operations personnel to identify equipment and cross-reference information within the O&M manual and drawings.</u>"		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 2.
536	FMIT-163	Section 1		The plan should set out how CEQA requirements will be met when changes occur during the decades-long operation of the remedy, and how the Tribe will participate in that review.	As operation of the project proceeds, PG&E will continue to implement the adopted mitigation measures, which include multiple requirements for Tribe monitoring, outreach, and coordination during operation of the remedy, including the protocols for continued communication and tribal communication to be set forth in the CIMP that is required pursuant to Mitigation Measure CUL-1a-8. It is PG&E's understanding that changes generally will not require a further CEQA review process unless there is a discretionary project approval that triggers such a review. Absent such a new future project approval, the CEQA review process will have been completed, and tribal participation will be pursuant to the Mitigation Measures including the CIMP. If there is a new discretionary approval based on some change in the remedy, however, it is PG&E's understanding that DTSC would evaluate the proper CEQA document for any such required new approval, and the form of that document will depend on the nature of the new approval. PG&E understands that DTSC as lead agency would follow the required CEQA procedures according to the type of document to be prepared.	In addition to CEQA requirements for public involvement, DTSC will continue to work collaboratively with the Tribes through established Consultative Work Group meetings as well as early communication with the Tribes pursuant to the 2006 settlement agreement. DTSC will work with the Tribes and the CTF, a subgroup of the CWG, to clarify the relationship between CEQA and the environmental investigation and cleanup process for the public, stakeholders, and the Tribes.		This is an open issue that will be carried forward to the 90% design.	This is an open issue that will be carried forward to the 90% design.	Not applicable

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537	DOI-209	Section 2.1.1.1, Page 2-2	"Dual screen extraction wells will be constructed with a dedicated pump for each well screen with the intervals separated using a pneumatic packer."	Will the dual screen extraction wells share the same riser pipe? If not, the text should specify that each screen will have a dedicated riser pipe.	It is anticipated that the dual screen extraction well pumps will have dedicated riser pipes. Section 2.1.1.1 will be revised to reflect this.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 2.1
538	DOI-210	Section 2.1.1.1, Page 2-2	"Conveyance piping from extraction well IRZ-23 to the main groundwater conveyance header will be double-contained and include leak detection instrumentation at low points."	The significance of well IRZ-23 should be for clarification purposes. Leak detection should also be considered for the connection between conveyance pipeline and the main header.	The concrete trench containing piping for IRZ-23 will slope to the low points and, therefore, to the leak detection instruments. The IRZ-23 conveyance line exits double-containment in the carbon amendment room at the MW-20 bench, a room that already includes leak detection equipment.		Comment resolved.		Comment resolved.	Not applicable
539	DOI-211	Section 2.1.1.1, Page 2-2		What casing material will be used for the extraction wells? Will cathodic protection be required?	Well construction details, including casing material and corrosion protection measures, are included in the 60% BOD Report, Section 3.2.5.1. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 2.1
540	DTSC-151	Appendix L O&M Plan Volume 1 2.1.1.1 NTH IRZ Extraction Wells Page 2-2	Conveyance piping from extraction well IRZ-23 to the main groundwater conveyance header will be double-contained and include leak detection instrumentation at low points.	Include the rationale for double containment and leak detection in this pipe segment and not others.	As described in Appendix C, Section C.5.1, conveyance pipelines will be single-walled unless the pipe is used to convey: 1) groundwater or remedy-produced water that exhibits the hazardous waste characteristic; or 2) concentrated carbon substrate. In these cases, double-walled piping will be used. Based on these criteria and anticipated remedy operations and groundwater concentrations, double-walled piping is included for conveyance associated with extraction wells IRZ-23, TWB-1, TWB-2, future provisional extraction well IRZ-40, IRL-4 remedy-produced water, and certain piping at the MW-20 Bench and Transwestern Bench Carbon Amendment Facilities.	Okay	Comment resolved.		Comment resolved.	Not applicable

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541	DOI-212	Section 2.1.1.3, Primary Carbon Amendment, Metering, and Control Equipment, Page 2-3	"A sample port and pressure gauge located downstream of the static mixer will be used for monitoring purposes."	Will a sample port be made available before carbon amendment is applied for sampling purposes?	Sample ports are located at each individual well for sampling purposes but are not included in the carbon amendment room prior to the static mixers. A sample port upstream of the static mixer will be included for collecting TOC samples for diagnostic purposes.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 2.1
542	DOI-213	Section 2.1.1.3, Primary Carbon Substrate Storage, Page 2-3	". . . , with secondary containment around the nozzles and connections as required by regulation and/or best practices."	If ethanol is the substrate of choice, it is presumed that the requirements for storage in fire rated, impact-resistant tanks with secondary containment would be instituted at the site. Please clarify the notation for containment around "nozzles and connections".	Ethanol storage tanks are specified as both fire-rated and impact-resistant with integral secondary containment. "Nozzles and connections" refers to portions of the ethanol filling and withdrawal system that are not immediately adjacent to the tank. This may include tanker hose connections at the tanker offload bays and piping connections inside the carbon amendment buildings.		Comment resolved.		Comment resolved.	Not applicable
543	DTSC-152	Appendix L O&M Plan Volume 1 2.1.2 Inner Recirculation Loop, Page 2-4	Three provisional Inner Recirculation Loop Injection Wells (IRL-5 through IRL-7,[1] see Figure 2.1-1). [1] IRL-6 may alternatively be considered as an extraction well with extracted groundwater re-injected into the other IRL injection wells.	Discuss or reference the section describing the basis for these provisional wells and criteria that would be used to trigger installation. Same issue for all provisional wells.	The basis for adding provisional wells is provided in the Sampling and Monitoring Program, Appendix L, Volume 2, Section 2. In particular, the basis for adding IRL provisional wells and the criteria used to trigger installation are discussed in Volume 2: Sampling and Monitoring Plan (Section 2.2.2; see also Figure 2.2-4). References to the appropriate sections of the Sampling and Monitoring Program (Volume 2) will be added throughout this section of Volume 1 in the 90% Design Submittal. Additional language will be added to the 90% design discussing the need for flexibility to locate wells in the future as the remedial program evolves. Any modifications would be discussed with stakeholders prior to implementation.	As suggested after the October 2013 site walk, DTSC would prefer PG&E to propose a wider area for contingency wells instead of specific dots on a map. Please include text that conveys this message as well. Comment resolved pending review of the 90% design.			Comment resolved.	O&M Manual Volume 1 Section 2.1
544	DOI-214	Section 2.1.2.1, Page 2-4	"The River Bank Extraction Wells are currently anticipated to be constructed with 8-inch diameter well casing, . . . "	Provide the anticipated type of well casing material. Is cathodic protection required?	Well construction details, including casing material and corrosion protection measures, are included in the 60% BOD Report, Section 3.2.5.1. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 2.1

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545	DTSC-153	Appendix L O&M Plan Volume 1 2.1.2.2 Inner Recirculation Loop Injection Wells, Page 2-5	Water captured by the River Bank Extraction Wells will be amended with carbon substrate if the Cr(VI) concentrations are greater than 32 micrograms per liter (µg/L). The Sampling and Monitoring Plan in Volume 2 of this O&M Manual presents the monitoring plan for collecting and evaluating analytical data to determine whether or not carbon amendment will be required according to this criterion.	Injection criteria should be developed for constituents other than just chromium. What if the riverbank water contains elevated constituents (e.g., nitrate, selenium, molybdenum, etc.). What is the desired TDS level sought for injection and what is the TDS discharge limit? How much TDS will be added via addition of amendments (ethanol/lactate) or via conditioned water?	Remedy pumping and injection will be operated so that the extent of elevated concentrations of COPCs at the completion of the remedy does not extend beyond the current extent of the chromium plume. Management of the COPCs will not necessarily require carbon addition to the IRL, and setting discharge limits for injection could impede the efficient operation of the remedy. Therefore, COPC-based criteria for carbon addition have not been developed at this time. TDS limits for IRL injection are not necessary. This is because the selected remedy relies on the ability to inject water in order to mix water throughout the treatment zone, therefore, setting discharge limits is inconsistent with the selected remedy. The influent TDS and constituents of TDS will be monitored and addressed if found to be affecting well performance. Lactate and ethanol will be converted to biomass and bicarbonate alkalinity, a constituent of TDS. Sodium, the counter ion to lactate, would also contribute to TDS. However, other processes, such as precipitation of carbonate minerals, will reduce TDS within the IRZs. TDS concentrations over time were measured during the floodplain pilot test, and concentrations declined over the course of the study.	See response to comments 38, 145, and 181. Please explain the highlighted statement.			Discussion between DTSC, DOI, RWQCB, and PG&E is ongoing to resolve this comment. This topic will be carried forward. Resolution of this comment will be included in the 90% design. PG&E will also work on items related to this comment as directed in the Agencies' direction letter dated April 4, 2014.	Not applicable
546	DTSC-154	Appendix L O&M Plan Volume 1 2.1.2.2 Inner Recirculation Loop Injection Wells, Page 2-5	Below-grade piping between the IRL-4 valve and well vaults will be installed in double-contained piping with leak detection instrumentation at low points.	Briefly include the rationale for double containment and leak detection in this pipe segment and not others (or is the sentence a little unclear). Please clarify.	The following text will be added: "<u>Due to the steepness of the access road, secondary containment is included between the valve/ meter vault and the well vault. A sump pump and concrete containment vault is included near the well vault to capture and recover fluids emanating from a release. This approach also improves safety during operations and maintenance. For example during well maintenance, fluids can be pumped from the well directly into a temporary portable tank located near the meter vault located outside the ravine. This approach eliminates the need to haul a tank into the ravine.</u>"	Okay.			Comment resolved.	O&M Manual Volume 1 Section 2.1

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547	DOI-215	Section 2.1.3.1, Page 2-6	"The Transwestern Bench Extraction Wells will be operated at any given time . . . "	The combined nominal flow rate for the extraction wells should be 26 gpm, not 22 gpm.	The combined nominal flow rate for the Transwestern Bench Extraction Wells (TWB-1 and TWB-2) was correctly stated as 22 gpm.		Comment resolved.		Comment resolved.	Not applicable
548	DOI-216	Section 2.1.3.2, Page 2-6	"Similar to the Transwestern Bench Extraction Wells, an electric motor-operated submersible pump will be installed . . . "	If well ER-6 has potential for flooding, why has it not been decided at the 60% design stage to simply build an above ground vault? Are there other factors yet to be considered?	ER-6 was added to the 60% Design Submittal at a late stage as a result of stakeholder feedback, and the potential for flooding in the area had not been fully evaluated necessitating the inclusion of "may". The 90% Design Submittal will include the design of an elevated vault for the well.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 2.1.3.2
549	DOI-217	Section 2.1.3.4, Page 2-6	"The TW Bench carbon amendment system P&ID is shown on Drawing I-08-01 in Appendix A."	Will a sample port be provided for sampling at the TransWestern Bench, East Ravine, and Supplemental Flow extraction wells before carbon mixing occurs?	Each individual extraction well includes a sample port prior to groundwater from that well exiting the vault. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 2.1
550	DOI-218	2.1.3.4-Carbon Amendment System (TW Bench) pg. 2-7	Carbon Substrate Storage Instrumentation	Will instrumentation be installed to signal a high level alarm during tank filling operations?	Yes, a visual and audible alarm beacon near the ethanol offload stations will be included to notify the operators and tanker drivers of a high level in the ethanol storage tank as described on Page 2-7. In addition, both ethanol storage tanks include an internal fixed mechanical shut-off valve that prevents overfilling of the tank, also described on Page 2-7.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Sections 2.1.1.3 and 2.1.3.4.
551	DOI-219	Section 2.1.3.4, Carbon Substrate Storage Instrumentation Page 2-7		It is understood that there will be sample ports pre- and post-treatment, and that high level alarms will be installed. Please confirm.	Sample ports are located at each individual extraction well, within the carbon amendment buildings, and in the injection well vaults. High level alarms will be installed. See response to comment #550 DOI-218 for high level alarm discussion.		Comment resolved.		Comment resolved.	Not applicable
552	FMIT-164	Section 2.2.1.2		What is the expected height of the chain link fence for the primary freshwater supply well (HNWR-1). Have the visual impacts of the fencing been evaluated with tribal input? The Tribe prefers to minimize the presence of any necessary infrastructure.	The height of the chain link fence is anticipated to be 6 feet high (similar to the current fence for HNWR-1). A fence is necessary to protect the well and associated piping/ electrical and controls. As for evaluation of visual impacts, PG&E understands that per comment DTSC-237 (#750), DTSC will conduct additional CEQA review			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Appendix D Drawing C-01-01, Note 4. Total height of fence is about 6 feet plus 1 foot of barbed wire.

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					based on information in the final design.					
553	DTSC-155	Appendix L O&M Plan Volume 1 2.2.1.2 Components, Page 2-9	To allow for these wells to supplement the HNWR-1 well, if needed, the existing 6-inch diameter pipeline from Topock-2 and -3 wells will be retrofitted for connection to the new 12-inch pipeline in Arizona.	It is recommended that the existing 6-inch line be connected to the new 12-inch line during construction of the new line. A valve can also be installed to open the 6-inch line if the Topock 2-3 water source is needed for compressor station operations.	Comment noted. PG&E will take the suggestion into consideration in the 90% design. Topock-2 and -3 wells will be connected to the new 12 inch pipeline in Arizona.	Comment resolved.			Comment resolved.	This RTC is no longer applicable as the freshwater storage for remedy and TCS is now separate. Topock-2 and -3 wells will not be connected to the 12-inch freshwater pipeline.
554	DOI-220	Section 2.2.1.3, Page 2-9		Please provide additional explanation of the operation of Topock-2/-3 based on line pressure. Are the Topock-2/-3 wells expected to be operational on an intermittent basis or only when flow rates drop below required levels at the HNWR-1 well?	The operation scheme for freshwater supply will be determined at the 90% design, after further information is learned on the primary well from implementation of FWIP. Barring this forthcoming information and the final design details, it is more likely that the Topock-2/3 wells would be operated when flow rates drop below required rates in the primary supply well.		Comment resolved pending review of 90% design.		Comment resolved.	This RTC is no longer applicable as the freshwater storage for remedy and TCS is now separate. Operation of Topock-2 and -3 wells will not be tied to operation of the remedy freshwater supply well (HNWR-1A).
555	DOI-221	Section 2.2.2, Page 2-9		The in-text citation for DTSC 2012 is not in the Reference list, and needs to be added.	The in-text citation will be added to the Reference list.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 8
556	DOI-222	Exhibit 2.2-2, Page 2-11		The notes indicate the wastewater could be blended with conditioned remedy produced water. This is not mentioned in Appendix M. There are four types of wastewater generated by pre-injection treatment; backwash, regeneration, rinse, and neutralization. Appendix M indicates only the neutralization waste stream has been considered as a candidate for the cooling towers and IRZ wells. Are all these streams candidates for blending, or just the neutralization stream?	No, not all cited waste streams are candidates for blending. Exhibit 2.2-2 will be revised to reflect an arsenic only treatment system.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Exhibit 2.2-2.
557	DTSC-156	Appendix L O&M Plan Volume 1 2.3 Remedy-produced Water Management, Page 2-13		It is requested that this introduction section include brief discussion of the estimated volume of waste water generated. Perhaps the volumes can be included in Exhibit 2.3-1.	The volumes from Table F-1 (Appendix F) will be shown on Exhibit 2.3-1.	Okay. Please note that the O&M Plan should be a standalone document to be used on site after design and construction are complete.			Comment resolved.	O&M Manual Volume 1 Section 2.3, 1st paragraph.

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558	DOI-223	Section 2.3.2.4, Page 2-15	"Alarm conditions include the following: . . . "	There is no mention of high level alarms on the frac tank.	This section refers to the control system for the piping system, not tanks. Alarm conditions associated with the frac tank is in Section 2.3.1.4 (page 2-14, 3rd paragraph).		Comment resolved.		Comment resolved.	Not applicable
559	DTSC-157	Appendix L O&M Plan Volume 1 2.3.2.4 Control System, Page 2-15	For direct buried pipe segments, potential leaks will be monitored by measuring backwash pump discharge pressure and flow rates.	This method of leak detection seems less desirable, especially for slower leaks. What other alternatives exist? Please also remind the reader how often direct burial is proposed.	The following text will be added: "<u>In addition, annual pressure testing of these segments will be performed as routine operation. This will apply to over 60% of the 13,400 feet of piping sections with remedy produced water pipes</u>."	Based on current proposal, it is possible that slow leaks would not be detected for up to one year? Perhaps the use of double wall piping and moisture sensors would be more effective.			Response noted and will be considered in the 90% design.	O&M Manual Volume 1 Section 2.3.2.4.
560	DTSC-158	Appendix L O&M Plan Volume 1 2.3.3.2 Components, Page 2-16	• Future coagulant feed tank and pump system • Future dewatering aid supply system	Please discuss (or reference the appropriate section) the reference to "future" unconditioned water storage components.	PG&E is evaluating the feed systems for coagulants and dewatering aids (e.g., metering pumps, piping, and small storage containers), and will provide additional information at the 90% design. These systems are anticipated to fit in the current footprint of the remedy-produced water conditioning plant and the influent water tank farm.	All systems anticipated must be specified and fully designed for construction if PG&E anticipate their use. Anything not fully designed cannot be supplemented into the remedy without a separate decision process. Comment resolved.			Comment resolved.	O&M Manual Volume 1 Section 2.3.3.2.
561	DOI-224	Section 2.3.3.2, Page 2-17	"The Conditioned Water Storage system includes the following major components: • Remedy A-side conditioned water tank farm • Conditioned water tank.. "	For clarity, indicate that the 2nd bullet – Conditioned water tank refers to the Remedy B-side conditioned water tank.	The suggested change in text will be made.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 2.3.3.2.
562	DOI-225	Section 2.3.4.3, Page 2-18	"The Remedy A-side conditioned water tanks supply conditioned water to the IRZ wells . . . "	The text indicates the Remedy A-side conditioned water will be pumped across the Station. Does this refer to the TCS? Also, why would it need to be pumped considering the amount of elevation head between the conditioned water tanks and the MW-20 bench frac tank? Discuss the management of Remedy B-side conditioned water.	Correct, "Station" refers to the TCS. The Remedy A-side conditioned water tank farm is located at a ground elevation of about 609 feet and must move the water up to the main part of the Station located at about 626 feet elevation. Management of the Remedy B-side conditioned water is described in the last paragraph of Section 2.3.4.3 (page 2-19). Primary use for the		Comment resolved.		Comment resolved.	Not applicable

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					conditioned water is cooling tower makeup, and secondary use is re-injection to IRZ wells.					
563	DOI-226	Section 2.4, Page 2-19	"The power system will be transmitted at 480 VAC to 12K VAC along the pipeline corridors . . . "	It is stated in the text that power cables can be buried in accordance with National Electrical Safety Code 30 to 36 inches below grade, or as deep as 48 inches. Indicate what is proposed for the remedy electrical power.	In general, the 60% design proposes a minimum depth of 18 inches for buried low voltage power (up to 480volts) and 36 inches for buried medium voltage power. If required to avoid conflict(s) with other utilities, power conduits may have to go deeper -- typical vertical separations from pipes could be 6-12 inches. The field effort to resolve conflicts where remedy utilities cross foreign utilities will help determine the precise depths of buried utilities, and this information will be incorporated into the 90% design. In some cases, options exist to bury power conduits at a shallower depth, e.g., through the use of concrete encasement.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Section 3.5.1 O&M Manual Volume 1 Section 2.4
564	DTSC-159	Appendix L O&M Plan Volume 1 2.4 Power Supply and Distribution, Page 2-19	Secondary power supply will be power generated from small photovoltaic solar panels at various locations such as the Central Maintenance Facility at the Transwestern Bench and at select remote well locations.	Why not put solar panels on most/all new remedy buildings? Why only select structures?	The reference text does not preclude solar panels from being considered for other remedy structures. PG&E is evaluating solar panels for all remedy buildings, and will include in 90% design as appropriate. Text will be included in the 90% BOD to reflect this response.	Okay.			Comment resolved.	90% BOD Section 3.5.1 O&M Manual Volume 1 Section 2.4
565	FMIT-165	Section 2.4		The burial depths for voltage vary. What is the proposed depth? How much of this system is in areas classified as sensitive in the geoarchaeological report?	In general, the 60% design proposes a minimum depth of 18 inches for buried low voltage power (up to 480volts) and 36 inches for buried medium voltage power. If required to avoid conflict(s) with other utilities, power conduits may have to go deeper. See also response to comment #563 DOI-226. Text will be added to the 90% BOD. See attached map showing an overlay of the 60% design on the layer showing sediment ranks from the geoarch report (see **Attachment L**, at the end of this table). As discussed in the response to			Comment resolved pending review of the 90% design. The Tribe notes that the CIMP is not yet completed as of 12/17/13.	Comment resolved.	90% BOD Section 2.4.

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				How can potential impacts to buried cultural resources be avoided?	comment #434a FMIT-126, the potential ranking only represents relative probability and does not predict actual locations of buried archaeological materials or suggest preferred locations for aboveground vs. belowground infrastructure. Reference the geoarch potential map in the 90% BOD. Section 3.2 of the Draft Geoarchaelogical Assessment presents recommendations to avoid potential impacts to buried archaeological or historical sites during design/construction. These call for excavations in higher or moderate potential sediments to be avoided to the extent feasible, and if necessary, to be monitored by an archaeologist and a tribal representative. If archaeological or historical resources are discovered, they would be treated according to the requirements of the CIMP, PA, and CHPMP. In accordance with the monitoring protocol of the PA, the Tribes will be provided the opportunity to monitor excavations and all ground disturbing activities.					
566	DOI-227	Section 2.5, Page 2-19	“A SCADA system will be installed for controlling and monitoring the remedy.”	Will selected operators be able to remotely check on system operation status from home computers? Will operators be able to make changes to operations remotely?	The control scheme is being developed and will be included in the 90% design. It is envisioned that authorized personnel will be able to check on the system status remotely and provide the necessary responses. Security considerations are factored in the design to maintain system security.		Comment resolved pending review of 90% design.		Comment resolved.	90% BOD Table ES-1 90% BOD Section 3.5.2 O&M Manual Volume 1 Section 2.5
567	DOI-228	Section 3, Page 3-1	“For the reader’s convenience, select process and instrumentatio n diagrams have been included in Appendix A of this Volume.”	P&IDs are provided for convenience, but rarely does the text reference specific P&IDs to facilitate understanding of the operation. This is rather inconvenient. Please provide the appropriate references to the drawings.	Comment noted. References to drawings will be added to the text.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Sectiosn 3, 3.1, and 3.2.
568	DTSC-160	Appendix L O&M Plan Volume 1 3.1.1.1 NTH IRZ Extraction and	Initially, the NTH IRZ Injection and Extraction Wells will be operated to	The time for estimated cleanup (among other things) should be recalculated after actual flow rates for all remedy components are established and new hydraulic data	See response to comment #653 DOI-268.	Okay.			Comment resolved.	Not applicable

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		Recirculation, Page 3-1	target flow rates as specified in Table 2.1-1. However, actual flow rates may vary in the field.	become available. A schedule to conduct this update(s) should be included in the design document. A schedule to assess the accuracy of the groundwater flow and transport model over time should also be prepared.						
569	DOI-229	Section 3.1.3, Page 3-3		Because there is a single header feeding all of the north (or south) NTH IRZ injection wells, adjustments to the flow of any one well to add additional carbon reduces the flow at some or all of the other wells, as the extraction well flow rate is fixed. Although it is not proposed that there be individual lines from the carbon amendment system at the MW-20 Bench to all the injection wells, it seem that system adjustments, including carbon injection rates, to achieve optimum carbon dosing will be tricky at best.	PG&E does not anticipate the need to routinely implement the dosing of specific quantities of carbon substrate to wells on an individual basis. However, if certain wells within the north or south branches of the NTH IRZ require supplemental substrate injections, provisions have been included for dosing immediately at the well vaults. An SOP for this operation will be included in the 90% Design Submittal. Text will be included in the 90% BOD to reflect this response.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 3.1
570	DOI-230	Section 3.1.3, Page 3-3	"The target carbon load will be based on the extracted groundwater flow rate of each individual well and the target in-situ carbon concentration. As summarized in Section 2.1.1.4 and detailed in the Sampling and Monitoring Plan in Volume 2 of this O&M Manual, carbon substrate amendment concentrations, frequency, and duration will be adjusted based on analytical groundwater data and injection well performance data."	Will carbon concentration analyses be performed at the site or off-site at a laboratory?	All analyses associated with sampling events identified in the Sampling and Monitoring Plan (Appendix L, Volume 2) will be performed by an off-site analytical laboratory. However, additional supplemental sampling may be performed that will include on-site field analyses, including total organic carbon (TOC) analysis. PG&E is currently in the process of testing bench procedures for on-site TOC analysis with site groundwater. If these procedures are to be implemented, details will be added to Appendix L in the 90% Design Submittal, including analysis SOPs and references at appropriate locations in the document.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2, Section 7.1

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571	DTSC-161	Appendix L O&M Plan Volume 1 3.1.3.2 NTH IRZ Carbon Substrate Amendment, Page 3-7	Three separate injection well location designs exist for the NTH IRZ injection system: a single-screen injection well design, a dual-screen well design, and a dual-screen injection well clusters design.	Due to the size of the design document, the location of the well design section should be cited here. Detailed drawings and associated text will need to be prepared for review.	A reference to Appendix D, Design Drawings, which describes the IRZ well designs, will be provided in this section.	The O&M Plan should be developed as a separate stand-alone document for the O&M phase of the remedy. References to BOD is not appropriate and should be appended to the O&M plan. Comment resolved.			Comment resolved.	O&M Manual Volume 1 Section 3.1
572	DTSC-162	Appendix L O&M Plan Volume 1 3.1.3.2 NTH IRZ Carbon Substrate Amendment, Page 3-7	The appropriate injection sequence will be selected based on chemistry results.	Please prepare a flow chart to assist the reader in understanding how the chemistry will influence operations.	This flow chart has already been prepared and is included as Figures 2.2-2, 2.2-4, and 2.2-6 in the O&M Manual Volume 2: Sampling and Monitoring Plan. The details on how chemistry results will be collected and used to determine operations is also described in Sections 2.2 and 4.2 of Volume 2. References to Volume 2 will be included in this section in the 90% design.	Okay.			Comment resolved.	Figures 2.2-2, 2.2-4, and 2.2-6 in the O&M Manual Volume 2.
573	DTSC-163	Appendix L O&M Plan Volume 1 3.1.3.4 Carbon Amendment Procedure (Transwestern Bench), Page 3-9	Continuous or intermittent injection or dosing of the selected carbon substrate, carbon substrate target TOC concentrations, and injection frequency and duration will be adjusted based on groundwater analytical data and injection well performance, as summarized in Section 2.1.3.5 and presented in Volume 2 of this O&M Manual.	It does not appear that a section 2.1.3.5 exists (probably should be 2.1.3.4). Please revise. Please include the section(s) to Volume 2 for quick reference.	The reviewer is correct. The reference will be updated in the 90% Design Submittal to refer to Section 2.2.3. A reference to Section 4 of Volume 2 will also be included in the 90% Design Submittal.	Okay.			Comment resolved.	O&M Manual Volume 1 Section 3.1

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574	DTSC-164	Appendix L O&M Plan Volume 1 3.1.5 Regularly Scheduled Equipment O&M, Page 3-11 to 3-13	Maintenance Requirements	Please include a schedule for conducting inspections in the maintenance requirement sections.	Inspection schedules will be included in the 90% Design Submittal.	Okay pending review of the 90% BOD.			Comment resolved.	O&M Manual Volume 1 Section 3.1
575	DTSC-165	Appendix L O&M Plan Volume 1 3.1.6 Standard Operating Procedures and Equipment O&M Manuals, Page 3-13		It is requested that all SOPs be released (in batches?) as soon as possible for review by interested parties. This is suggested to minimize the burden of reviewing numerous SOPs with the 90% design.	PG&E will take this under advisement, but cannot commit to releasing SOPs in batches prior to the final 90% Design Submittal.	Response noted. Significant time may be necessary for stakeholders, Tribes and agencies to review all SOPs.			Comment resolved.	Not applicable
576	DTSC-166	Appendix L O&M Plan Volume 1 3.1.6 Standard Operating Procedures and Equipment O&M Manuals, Page 3-13	Conveyance system maintenance	Modify the SOP to include “Conveyance system maintenance and inspection” so that any concerns with underground leakage are addressed.	The text will be modified as suggested for the 90% Design Submittal.	Okay.			Comment resolved.	O&M Manual Volume 1, Section 3.1.6 and PIPE-SOP-01
577	DTSC-167	Appendix L O&M Plan Volume 1 3.5 Power Supply and Distribution, Page 3-19		This section should address solar O&M on some level.	An SOP will be prepared to address solar O&M and included in the 90% design.	See comment to #575 DTSC-165. Comment resolved.			Comment resolved.	O&M Manual Volume 1 Section 3.4, Section 7.6
578	DTSC-168	Appendix L O&M Plan Volume 1 Well Maintenance and Decommissioning, Page 4-1	This section will include the general approach for decommissioning wells related to the Final Remedy at Topock and will be a guide to determining the appropriate methods for a given well.	This sentence must be modified to indicate that all PG&E Topock Compressor Station Wells utilized as part of site characterization activities will also be decommissioned according to applicable laws and the forth coming SOP. The section must contain a comprehensive list of all wells to date that will eventually need to be decommissioned. This list should also include those wells already decommissioned.	The referenced sentence will be revised as follows (<u>underline</u> typeface is added text): “This section will include the general approach for decommissioning wells related to the Final Remedy at Topock, <u>and wells utilized as part of site characterization activities,</u> and will be a guide to determining the appropriate methods for a given well. Section 4.3 (Well Decommissioning) states that the SOP for well decommissioning will be presented in Appendix C of the O&M Plan at the 90% stage. Section 4.3 will also include a reference to the master well inventory for the Topock	Okay pending review of the 90% BOD. Clearly specify in this section where the comprehensive list of all wells is kept. It can be repeated within the large 90% BOD.			Comment resolved.	O&M Manual Volume 1 Section 4, Section 4.3

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					project. This SOP includes a list of all wells that have been utilized as part of site characterization activities and those wells already decommissioned.					
579	DOI-231	Section 4.1.1.1, Page 4-2	"Water level logging with the level probes should begin 1 to 2 weeks prior to startup so that background water level trends can be evaluated."	It is recommended that the river stage should also be monitored during this time period.	The referenced sentence will be revised as follows (<u>underline</u> typeface is added text, ~~strikethrough~~ typeface is used for deleted text): "Water level <u>logging</u> (with level probes)<u> in all wells associated with the given test as well as in the Colorado River</u> ~~with the level probes~~ should begin 1 to 2 weeks prior to startup so that background water level trends can be evaluated."		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 4.1
580	DOI-232	Section 4.1.1.2, Page 4-2	"Following installation and development, a key freshwater or amended water injection well . . . "	It is stated in the text that extracted groundwater will be tested to confirm that is suitable prior to reinjection. What are the analytes to be tested and what are the criteria for suitability?	The referenced text will be revised to be consistent with the requirements of both California State Water Resources Control Board Water Quality Order No. 2003-0003-DWQ, and the State Board letter as follows: "Following installation and development, a key freshwater or amended water injection well will be tested to evaluate its maximum injection flow rate. This testing will involve extracting water from the well, storing the water in portable tanks, then injecting the water back into the well through a filter to remove particulate matter. Chemical additives will not be used during well testing activities, and therefore, the water will not be tested prior to re-injection."		Comment resolved.		Comment resolved.	90% BOD Section 3.3.3 O&M Manual Volume 1 Section 4.1
581	DTSC-169	Appendix L O&M Plan Volume 1 4.1.1.1 Well Capacity, Page 4-2	Water level logging with the level probes should begin 1 to 2 weeks prior to startup so that background water level trends can be evaluated.	This section should make reference to deconvolution methods that will be utilized to evaluate water level data at the site. The remedy design document will need a section dedicated to discussion of the deconvolution technique. Don't recall seeing discussion of it elsewhere.	It is not anticipated that deconvolution would normally be used to evaluate water levels or well performance. Water level evaluations will rely on averaging over a period of time to damp out river fluctuations, similar to what is done now to monitor water levels in response to IM-3 pumping. Specific capacity or injectivity can be measured without the need for deconvolution because the water level change in the pumping or injection well is large compared to the river influence. Deconvolution has only been used in the past to analyze results of short term aquifer tests, which are not planned in conjunction with routine well maintenance discussed in this	Consider the need for assessment of hydraulic influence at the margins of pumping/injection (e.g., where it may be desirable to show containment or hydraulic effect. While this does not seem the appropriate section, it does seem that it might be used for the project and must be included in the project tool box. Comment resolved pending review of 90% design.			Comment resolved.	See Section 3.1.1.5 (Well Testing) of the Construction/Remedial Action Work Plan.

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					section. A reference to the deconvolution tool will be added to the O&M Manual, Volume 1, Section 4.					
582	DTSC-170	Appendix L O&M Plan Volume 1 4.1.1.2 Flow Logging and Aquifer Testing, Page 4-2	Flow logging can be a useful element of the baseline evaluation for wells that are constructed screen intervals greater than 75 feet in length.	Why 75 feet? Certainly flow logging can be done in wells with shorter screens. Please clarify and revise text.	75 feet is a somewhat arbitrary number based on the thickness of the alluvial aquifer at the site. While flow logging can be done on wells with shorter screens, the data are less useful. The sentence will be revised to read "Flow logging can be a useful element of baseline evaluation, particularly in longer screened wells. In shorter screened wells (less than about 75 feet of screen length) there is typically less need to understand the variations in flow along the screen and therefore flow logging is less useful."	Okay.			Comment resolved.	O&M Manual Volume 1 Section 4.1
583	DTSC-171	Appendix L O&M Plan Volume 1 4.1.1.2 Flow Logging and Aquifer Testing, Page 4-2	This testing will involve extracting water from the well, storing the water in portable tanks, testing the extracted water to confirm that it is suitable for injection back into the aquifer, then injecting the water back into the well through a filter to remove particulate matter.	Specify what testing of the extracted water will be conducted to confirm that it is suitable for injection back into the aquifer.	See RTC #580 DOI-232.	See RTC #580 DOI-232.			Comment resolved.	90% BOD Section 3.3.3 O&M Manual Volume 1 Section 4.1
584	DTSC-172	Appendix L O&M Plan Volume 1 4.1.1.2 Flow Logging and Aquifer Testing, Page 4-2	Once the system is online and operational, the well capacity baselines will be re-evaluated over a much longer period to confirm that steady state conditions are	Specify/clarify what the anticipated frequency for aquifer testing (well capacity/injectivity testing) will be over the duration of the project. This section should probably reference Exhibit 4.1-3.	The title of this section is not correct. Aquifer tests which typically involve pumping a single well at a controlled rate for a long period of time and monitoring water levels in a number of monitor wells are not planned. The title will be revised to read "Flow Logging and Well Performance Testing". Section 4.1.1.2 describes the baseline evaluation planned to evaluate if the newly installed wells are performing at their design flow rates during and shortly after the	Okay.			Comment resolved.	O&M Manual Volume 1 Section 4.1

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			met and the capacity is not fluctuating. It is expected that this will be done during the first month to few months of the system being commenced.		startup of the system. Frequency of well performance evaluation over the duration of the remedial action will be monthly, as shown in Exhibit 4.1-3.					
585	DTSC-173	Appendix L O&M Plan Volume 1 4.1.1.3 Video Survey, Page 4-2	Once testing is complete, and all equipment is removed from the well, a baseline video survey will be conducted on select wells to support diagnosis of future well problems.	List the wells that will definitely be surveyed by video. Also include a list of wells that might be surveyed and those that are not planned on being surveyed.	The second sentence of Section 4.1.1.3 will be revised as follows (underline typeface is added text, ~~strikethrough~~ typeface is used for deleted text): "Once testing is complete, and all equipment is removed from the well, a baseline video survey will be conducted on ~~select wells~~ all remediation wells to support diagnosis of future well problems.	Okay.			Comment resolved.	O&M Manual Volume 1 Section 4.1
586	DTSC-174	Appendix L O&M Plan Volume 1 4.1.1.4 Water Quality Sampling, Page 4-3	Exhibit 4.1-1 a Parameters will be collected during baseline monitoring, and may not be collected at later sampling dates.	It is requested that the analytes with footnote "a" be samples two or three times to establish an early, more, representative baseline. This section should clarify that the sampling pertains to maintenance issues and that conventional plume and remedy effectiveness monitoring are detailed in other volumes. Similar revision should be applied to section 4.1.2.3 Water Quality Monitoring on page 4-6.	Footnote "a" applies to analytes scheduled for baseline assessment of IRZ injection wells. All IRZ injection wells will be installed in areas of similar hydrogeologic condition, and the baseline analytical results for all IRZ wells will be evaluated together to determine if any of the data points appear to be anomalous or representative of a condition not observed at other IRZ locations. The text will be revised to state that two baseline samples will be collected to establish the baseline condition. A third baseline sample will be collected if it is necessary to confirm the baseline condition should a given data point appear anomalous. It is assumed that the two baseline samples will be collected approximately one month apart; however, the time between samples might be shortened if determined necessary to ensure that the collection of these samples doesn't delay startup of the system. Changes to the duration between samples will be discussed with the agencies prior to implementation. The following statement will be added to the beginning of Sections	The table needs revision. It is not clear that footnote "a" applies to IRZ injection wells. Sampling the IRZ injection wells two or three times is requested for establishing a representative baseline. Hydrogeochemical conditions should be understood prior to start up. PG&E must ensure this does not delay system start up. Please revise. Put this in a more appropriate water quality sampling section if necessary. Comment resolved.			Comment resolved.	O&M Manual Volume 1 Section 4.1

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					4.1.2.3: "Water quality monitoring in this section pertains specifically to the assessment and tracking of well performance. Water quality monitoring for the purposes of plume monitoring or remedy performance are detailed in other volumes."					
587	FMIT-166 Hualapai-120 Chemehuevi-120 Cocopah-120 CRIT-120	Append L-Vol 1 Section 4.1.1.4 p. 4-3	Exhibit 4.1-1	Please specify what sampling frequencies and statistics will be used to establish baseline conditions for the Biological and Geochemical Analytical Monitoring Parameters indicated in the notes to this table.	Sampling frequencies are detailed on Exhibit 4.1-3. A single sampling round is proposed for establishing baseline conditions. Biological and geochemical data will be collected to evaluate potential agents causing well fouling as water is being injected. In general, baseline data, collected before continuous extraction and re-injection begins, are not as useful for understanding well performance issues as trends in water quality (extracted and re-injected) over time. Trends in water quality can be correlated with changes in well performance. Therefore, no statistical analysis is planned for evaluation of well performance.			Comment resolved pending review of 90% design documents.	Comment resolved.	Not applicable
588	DOI-233	Exhibit 4.1-3, Page 4-5		Please explain why many of the monitoring parameters in this exhibit are not recommended for the IRZ injection wells.	Biological and Geochemical sampling, biological activity tests, and MFI: The changes in chemistry and bacteria in the IRZs will be dominated by the reducing conditions generated by the addition of ethanol and is well understood (i.e. biomass, reduced metals, sulfide, and alkalinity concentrations will increase). Measuring these changes will not provide insight into the causes of fouling, which are known to be due to biological growth and precipitation of iron sulfide and carbonate minerals and therefore these measurements are not specified. Sand Content: sand may cause well clogging. The source of sand would be extraction wells where the water for re-injection is sourced, not the from the injection wells themselves. Therefore, sand content measurements were specified for extraction wells rather than IRZ injection wells.		Comment resolved pending review of the 90% design.		Comment resolved.	Not applicable

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589	DOI-234	Exhibit 4.1-3, Page 4-5	Note a	Why would the SCADA system not be capable of calculating a daily average well capacity?	Failure of the downhole water level transducers is likely the most common reason that well performance data might not be available from the SCADA system. The provision for manual measurement is included in the event the SCADA system is inoperable, regardless of the reason for failure. Note that there is a typographic error in Note A. Quarterly will be changed to Monthly.		Resolved.		Comment resolved.	O&M Manual Volume 1 Section 4.1
590	DOI-235	Exhibit 4.1-3, Page 4-5	Note b	Suggest modifying the sampling schedule so that extraction wells are sampled semiannually between years 1 and 2 of operation, and then sampled annually after year 2.	Concur. The note b will be revised as follows (<u>underline</u> typeface is added text, ~~strikethrough~~ typeface is used for deleted text): "Extraction wells will be sampled monthly for the first quarter, quarterly for the next three quarters, <u>semiannually between years 1 and 2 of operation</u>, then annually after the <u>second</u> ~~first~~ year of operation."		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 4.1
591	DTSC-175	Appendix L O&M Plan Volume 1 4.1.2 Long-Term Performance Tracking, Page 4-5	Exhibit 4.1-3 [b] Extraction wells will be sampled monthly for the first quarter, quarterly for the next three quarters, then annually after the first year of operation.	Footnote b. Depending on results, DTSC may request more frequent sampling, especially if effects of operations have not stabilized or are not anticipated. This applies to all monitoring, not just maintenance monitoring. Why are the Field Screening methods listed as annually? It would seem that they would lend themselves to more frequent monitoring. It would seem the IRZ column should be more populated. Why wouldn't you periodically evaluate field parameters (e.g., turbidity), sand content, or even geochemical sampling. Also note that footnote C is missing.	Footnote b comment is noted. The field screening data are listed for annual monitoring based on the frequency of groundwater sampling events. Additional field screening data can be collected as needed, but each sampling event is increased field presence and associated impacts. See response to comment #588 DOI-233 regarding the scheduled analysis of samples collected from IRZ injection wells. The reference to footnote c has been removed from the table. Please note that the frequency for "Field Screening Sampling and Testing" has been revised to be "Annually, or as needed".	Okay, however, as commented, DTSC may request more frequent sampling if effects of operations have not stabilized.			Comment resolved.	O&M Manual Volume 1 Section 4.1
592	DOI-236	Section 4.1.2.1, Page 4-5	"To evaluate the level-indicating transmitter (LIT) accuracy and as a backup in case of level transmitter failure, water levels should be measured	Will water level measurements in injection wells be made through the 1-inch sounding pipe identified in drawing I-02-03? Will a 1-inch sounding pipe be present in extraction wells?	See drawing M-02-02 for a better representation of the sounding tube in the freshwater injection wells. This tube will be installed in the gravel pack outside the well casing. It is intended to provide a measurement of the water level outside the well screen when the well is in operation. This water level will be compared with the water level inside the well to evaluate the degree of plugging in the screen and gravel pack. Sounding		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 4.1

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			manually as part of the performance evaluation and documented for reporting purposes."		tubes in extractions wells will be considered for the 90% Design Submittal.					
593	FMIT-167 Hualapai-121 Chemehuevi-121 Cocopah-121 CRIT-121	Append L-Vol 1 Section 4.1.2.1 p. 4-6	*The demotion/ promotion of the performance color code will result in consideration for routine maintenance frequency changes (see Exhibit 4.2-1 in Section 4.2.1, Routine Maintenance). For example, if the capacity of a given well drops below 85 percent, the well will be coded as yellow and potentially undergo more frequent maintenance or rehabilitation until the capacity is improved.*	Please provide additional detail on how well capacity will be determined. For example is capacity based on one time measurements or statistical averages? Also how will reduced efficiencies be determined? This is of importance as it will be used to drive the possible decision for increases in well rehabilitation frequencies or determine the need for well replacements, both activities which will lead to increased field presence and associated impacts.	Well performance will be tracked in the same way it has been tracked for the IM-3 injection wells. The specific capacity or injectivity will be estimated based on measurements of flow and water level when the well is first put into service. These measurements are made after the well has been pumping or injecting for a sufficient time to allow water levels to stabilize. The flow rate divided by the drawdown (or "drawup" in an injection well) provides a measure of the specific capacity or specific injectivity in the well. The specific capacity/injectivity values will be plotted on a graph. If the line on the graph shows the average specific capacity or injectivity has decreased to 85% of the original value, the well will be coded as yellow.			Comment resolved pending review of the 90% design.	Comment resolved.	Not applicable
594	DOI-237	Section 4.1.2.2, Page 4-6	"1. Visual Inspection. The aboveground discharge/ supply pipe, . . . "	The applicability of ARAR 47, (Exemption of Superfund remedial action activities; use requirements; definition), to visual inspections is unclear. ARAR 48, (well construction standards; remedial measures), specifies that "all well construction, replacement, deepening and abandonment operations shall comply with the rules adopted pursuant to this section". Please provide specific citation of the applicable rules regarding well inspections.	The comment is correct that ARAR #47 does not apply to well inspections. ARARs #48 and #98 pertain to well construction standards but not with inspections per se. The intent for including these two ARARs is to recognize the well standards and that the wells will be inspected to meet the requirements of these standards. If helpful, the cited text can be revised to remove the reference to ARARs as follows: "The aboveground discharge/supply pipe, valves, gauges, meters, well seals, well pads, vaults, and flanges should be inspected for visible leaks and damage ~~per the following~~		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 4.1

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					~~applicable, relevant, and appropriate requirements (ARARs) for California (ARAR 98) and Arizona (ARAR 47 and 48) (DOI 2010).~~"					
595	DTSC-176	Appendix L O&M Plan Volume 1 4.1.2.2 Wellhead Inspection and Field Parameter Testing, Page 4-6		An SOP needs to be prepared and referenced in this section for visual inspections of well heads. DTSC has been working with PG&E recently on this item and expects similar procedures to persist throughout the remedy.	An SOP for inspection of wells associated with the groundwater remedy will be included in the 90% design. This SOP will be based on the one currently used for wells associated with the groundwater monitoring program, which DTSC has worked with PG&E to develop.	Okay. As stated earlier, the O&M plan should be a standalone document to be followed during the 30+ years of remedy operation. This SOP should be part of the O&M Plan.			Comment resolved.	O&M Manual Volume 1 Well-SOP-08
596	FMIT-168	Section 4.2.2		It appears a consequence of failure to maintain the wells can result in additional intrusion. The Tribe requests that regular maintenance occur to minimize the need for non-routine maintenance.	Comment noted. Regular maintenance schedules are outlined in Section 4.2.1.			Comment resolved pending review of 90% design documents.	Comment resolved.	Not applicable
597	DOI-238	Section 4.2.2.3.1, Page 4-12	"2. The video survey should be conducted using a color camera capable of side-scanning and photography plus video recording of the survey so that it can be viewed later."	Will depth be recorded with the video, allowing the viewer to determine the depth that corresponds with specific video segments?	Yes. The commercial well video cameras record the depth on each frame of video. The following sentence will be added: "The video survey will also be encoded with depth."		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 4.2
598	DTSC-177	Appendix L O&M Plan Volume 1 Flow Logging and Aquifer Testing, Page 4-12	Spinner logging and aquifer testing will be completed before and after rehabilitation to assess the success of the rehabilitation program.	Replace "Spinner" with "Borehole flow meter" of "Borehole flow" to acknowledge that other types of flow logging might be utilized.	The text will be revised as requested.	Okay.			Comment resolved.	O&M Manual Volume 1 Section 4.2
599	DTSC-178	Appendix L O&M Plan Volume 1 *Air Impact Gun*, Page 4-13	Air impact gun methods are available through the following licensed dealers:	Suggest the following edit to add flexibility overtime, "Air impact gun methods are <u>known to be currently</u> available through the following licensed dealers:" A similar edit is requested on Page 4-21 for wire charge device dealers.	The text will be revised as requested.	Okay.			Comment resolved.	O&M Manual Volume 1 Section 4.2
600	DOI-239	Section 4.2.2.3.3,	"4. Injection. . . . The volume of each batch	Will the isolated zones be isolated via a packer and/or dual packers?	Yes.		Comment resolved.		Comment resolved.	Not applicable

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		Page 4-14	injected into an isolated zone should be calculated . . . "							
601	DTSC-179	Appendix L O&M Plan Volume 1 Injection, Page 4-14	Chemicals may be added from the well head for wells with short screens.	If reagents are going to be poured down the well from the top of casing, clarify if it will be necessary to remove the concentrated reagent from the sides of the well (e.g., prior to collecting a representative sample from the rehabilitated well). DTSC recommends that a tremie pipe always be used.	Agreed. The text will be revised to say (inserted text shown in underline typeface, deleted text shown in ~~strikethrough~~ typeface): "Chemicals should be added through a tremie pipe from the well head in ~~for~~ wells with short screens"	Okay. Change may to will or should.			Comment resolved.	O&M Manual Volume 1 Section 4.2
602	DOI-240	Section 4.2.2.3.4, Page 4-15	"● Phosphoric acid has no particular advantage over other acids except for sulfate salt removal (Smith 2007) except the ability to dissolve iron and manganese compounds."	This sentence appears incomplete. Please consider that the Smith article further recommends that the shock method of treatment be used to remove sulfate minerals instead of using phosphorus-containing chemicals, noting that residual phosphorus can act as a nutrient and actually boost regrowth. Phosphorus-containing material also promotes algal and cyanobacterial growth in surface waters.	The first sentence will be revised as follows (inserted text shown in underline typeface, deleted text shown in ~~strikethrough~~ typeface): "Phosphoric acid has no particular advantage over other acids in the ability to dissolve iron and manganese compounds except for sulfate salt removal (Smith 2007) ~~except the ability to dissolve iron and manganese compounds~~." It is agreed that phosphoric acid appears to have several drawbacks, as noted in the discussion, but it may still be useful in some specific situations so it should be included as an option.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 4.2
603	DOI-241	Section 4.2.2.3.4, Page 4-15	General comment	This section is very generic. Please include a discussion of chemicals used for well rehabilitation at the Hinkley site, including information on what worked, what did not work, and any unforeseen complications. Also, please include text explaining that addition of hypochlorite can result in formation of trihalomethanes via reaction with soluble organics. Use of hypochlorite solutions should be avoided at Topock because of the high TOC content in the injection wells.	Lessons learned from the Hinkley operations have been incorporated into the O&M plan for Topock. The following details will be added to the text in the 90% design, "At Hinkley, hydrochloric acid was initially used for IRZ well cleaning and resulted in well screen corrosion. To date a phosphoric acid (NuWell 120 and a biodispersant (NuWell 310) have been used with success on IRZ, clean water injection and extraction wells. A variety of materials comprise the various well screens at the Hinkley site and include low carbon steel, copper bearing mild steel and stainless steel. No corrosion has been detected during post chemical cleaning video logging." Text will also be included in the 90% BOD regarding the use of chlorine based products and the formation of trihalomethanes.		Comment resolved pending review of the 90% design.		Comment resolved.	O&M Manual Volume 1 Section 4.2

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604	DOI-242	Section 4.2.2.3.6, Page 4-21	"While the original capacity may never be restored, reasonable rehabilitation results are roughly 75 percent of the baseline value."	What is the source of the 75 percent value, experience or scientific literature?	The 75% is a rough estimate based on experience with well rehabilitation at multiple sites. The sentence will be revised as follows: "While the original capacity may never be restored, experience with multiple wells at other sites suggests that successful ~~reasonable~~ rehabilitation ~~results~~ ~~are~~ can often restore roughly 75 percent of the baseline value."		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 4.2
605	DTSC-180	Appendix L O&M Plan Volume 1 4.2.2.5 Well Replacement, Page 4-22	If it is determined after further evaluation and discussions with agencies that a replacement well is warranted and that the most suitable location to achieve the well objective is within 200 feet of the original well location, well replacement will proceed under the scope of this O&M Plan.	The 200 foot criteria appears arbitrary and should be deleted. Suggest replacing "200 feet" with "the area" in the cited sentence. This is requested since the well in question is being removed since rehabilitation will not allow it to function properly any further. If moving the replacement well 245 feet, for example, makes the best technical sense, then DTSC requests that the well and the associated disturbance be situated so that it will provide valuable data for the longest amount of time. Of course, this is assuming the new area poses the same level of disturbance and concerned tribes have the opportunity for input.	Agree. Text changes will be made as suggested. PG&E notes that if the new well is in the same geologic conditions as the well it replaced, there would be no net change in the number of wells (see FEIR, Page 3-26).	Okay.			Comment resolved.	O&M Manual Volume 1 Section 4.2
606	FMIT-169	Section 4.2.2.5.		The Tribe appreciates the comment that well replacement is the least desirable option to achieve the given objective of the well. New wells cause impacts to this cultural area. Exhibit 4.2.7 indicates that over 50 years, each well can expect to be replaced. This means twice as many wells intruding into the landscape. Did the groundwater FEIR analyze that impact? If so, please cite to the pages. If not, please identify what process will be applied to evaluate the impacts of ongoing replacement.	The impacts of well replacement have been evaluated in the FEIR - Note 2 in Table 1-1 (page 1-4) states "Replacement wells were estimated to be 10% of the wells per year". This means up to 11 replacement wells per year (10% of 110 new remediation wells [excludes replacement wells]) were factored in the CEQA analysis over a 30-year life of the remedy, a total of 330 replacement wells. The assumptions in the O&M Plan (Exhibit 4.2-7) are environmentally more conservative than the FEIR when it comes to well replacement (up to 110 replacement wells), so the level of replacement set forth in the O&M plan is within what was			Comment resolved.	Comment resolved.	Not applicable

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					evaluated in the FEIR. See also FEIR pages 4.1-42 and 4.4-59.					
607	DOI-243	Exhibit 4.2-6, Page 4-23		Provide a footnote detailing the absence of well reconstruction for extraction wells and monitoring wells. Such an explanation of this issue would be appropriate in Exhibit 4.2-8 as well.	Footnotes will be added to Exhibit 4.2-6 and 4.2-8 to indicate that extraction wells are not considered to be good candidates for reconstruction due to their smaller borehole diameter and that monitor wells are generally not anticipated to need replacement or reconstruction (unless damaged).		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 4.2
608	DTSC-181	Appendix L O&M Plan Volume 1 4.2.3 Well Maintenance Frequency, Page 4-23/4	Exhibits 4.2-6 vs 4.2-8	Clarify in the reconstruction section why extraction wells (and monitoring wells) are not called out for reconstruction, yet injection wells are identified.	See response to comment #607 DOI-243.	Okay			Comment resolved.	O&M Manual Volume 1 Section 4.2
609	DOI-244	Section 4.2.4, Page 4-25	"The well performance tracking data will be evaluated and reported internally on a quarterly basis."	Clarify if "reported internally" refers to PG&E only. If so, justify why the data would not be disseminated to the agencies/stakeholders in operational reports.	The sentence will be revised to remove the word "internally" The well performance data will be included in the quarterly performance reports.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 4.2
610	DTSC-182	Appendix L O&M Plan Volume 1 4.2.4 Reporting, Page 4-25	The well performance tracking data will be evaluated and reported internally on a quarterly basis. The frequency of data evaluation and reporting may change as well performance trends evolve during system operation. A suggested Well Performance Report outline, which includes the reporting of maintenance activities, is shown in Exhibit 4.2-9.	Clarify that an initial quarterly reporting frequency for the Well Performance Report will be utilized.	See response to comment #609 DOI-244.	Okay			Comment resolved.	O&M Manual Volume 1 Section 4.2

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PG&E Topock Compressor Station, Needles, California

Item	Comment Number	Section/ Page	Reference Text	60% Design Comment	PG&E Response to 60% Design Comments	DTSC Response to 60% Design Comments	DOI Response to 60% Design Comments	Tribe Response to 60% Design Comments	Final Comment Resolution	Where responses are reflected in the 90% design documents?
611	DOI-245	Section 5.1, Page 5-1	"During operation of the CIP loop, all of the groundwater extraction pumps will be de-energized . . . "	Obviously an acid is being used to dissolve scale if pH stabilization is the criterion for maintenance completion. Because it is dependent on the strength of the acid and amount of scale, pH stabilization may or may not be an indicator that all scale has been dissolved. Therefore, pH stabilization would likely not be a good criterion for removal of biological growth. Please provide additional discussion to clarify the maintenance process.	Depending on the nature of any biological films or mineral scale that may develop in the pipelines, as well as the final reagent solution selection, there may be multiple potential criteria for assessing pipeline flushing completion. Additional discussion, including an SOP for this process, will be included in the 90% Design Submittal.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Section 5.1
612	DTSC-183	Appendix L O&M Plan Volume 1 5.1 Clean-In-Place (CIP) System, Page 5-1	The CIP solution will then be mixed in the reagent day tanks and pumped through the pipelines and into the receiving tank.	The section should be expanded to discuss what a "CIP solution" might contain similar to the section on well maintenance chemicals. Section 3.2.4 briefly discusses this, yet one would expect this section to contain more detail.	An exhibit listing potential CIP chemicals will be included in the 90% Design Submittal. An SOP for this process will be included in the 90% Design Submittal. See also response to comment #119 DTSC-34.	Okay.			Comment resolved.	O&M Manual Volume 1 Exhibit 5.1-1.
613	DTSC-184	Appendix L O&M Plan Volume 1 5.2 Maintenance and Repair of Plastic Pipe (HDPE), Page 5-2		As Section 2.3.2 (Conveyance of Unconditioned Remedy-produced Water) identifies conveyance pipeline pigging stations and cleanouts, these pipeline maintenance components should be described in detail in this section.	These elements will be included in the 90% design and added to the O&M Plan.	Okay.			Comment resolved.	O&M Manual Volume 1 Section 5.4
614	FMIT-170 Hualapai-122 Chemehuevi-122 Cocopah-122 CRIT-122	Append L-Volume 1 Sect. 6.1.1 p. 6-1	Expected Waste Streams	Please indicate where backwash and well rehabilitation waste water will be stored during the characterization step prior to the final disposal of this water.	It may be necessary at times during the remedy to hold wastewater for characterization prior to final disposal. Temporary portable tanks will be used to hold the water for this purpose. As discussed in response to comment #96a FMIT-25, portable tanks are not anticipated to be "installed" at wellheads for semi-permanent use. Clarification will be included in the 90% design documents.			Comment resolved.	Comment resolved.	O&M Manual Volume 1 Section 6.1
615	DOI-246	Section 6.1.3.1, Pages 6-3 and 6-4	General comment	This section needs to clearly state that the remedy-produced water conditioning plant is not designed for the treatment of RCRA and non-RCRA hazardous waste due to the presence of chromium and arsenic, and/or as a result of low pH (<2).	The following text will be added to the end of the 1st paragraph: "The conditioning plant is not designed for treatment of RCRA and non-RCRA hazardous waste."		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 6.1

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616	DOI-247	Exhibit 6.1-2, Page 6-4		For completeness, include Remedy A-side or Remedy B-side conditioning (or no conditioning) under the Management Plan column.	Text will be added as suggested.		Comment resolved.		Comment resolved.	90% BOD Exhibit 3.4-3 O&M Manual Volume 1 Section 6.1 Exhibit 6.1-2.
617	DOI-248	Exhibit 6.1-2, Page 6-4	Exhibit 6.1-2 and Figure 6.1-1	It seems that the chemicals used in the CIP may be similar to the chemicals used in well rehabilitation. Explain why CIP wastewater is not handled similarly to first flush well rehabilitation water.	The following text will be added at the beginning of footnote a: "Prior to transferring the spent solution to the remedy-produced water conditioning plant, the solution will be allowed to settle and precipitate solids prior to pumping to the conditioning plant."		Comment resolved.		Comment resolved.	90% BOD Exhibit 3.4-3 O&M Manual Volume 1 Section 6.1 Exhibit 6.1-2.
618	DOI-249	Exhibit 6.1-2, Page 6-4	Exhibit 6.1-2 and Figure 6.1-2	The third waste management option for first flush well rehabilitation water needs clarifying information to address the following points: • Why does the water need to be filtered before sending it to the conditioning plant, since the main purpose of the conditioning plant is the removal of solids? Based on Figure 6.1-2, it appears the concern focuses on whether the wastewater is a hazardous waste due to the presence of chromium and arsenic. Are pre- and post-filtration testing for chromium and arsenic to be performed at the TWB lab? • Because first flush rehabilitation water may be high in soluble chromium and arsenic even after filtration, and could also contain residual oxidants, it does not seem prudent to process this water through the conditioning plant and reinject it at the IRZ. Perhaps this method should not be an option.	If pumped through the pipelines could cause obstructions to form or accumulate solids at low points. It is better to remove the solids near the point of generation. If testing is needed, it would be performed at the onsite lab located in the Central Maintenance Facility. (see also response to comment #210 DOI-89). This method is appropriate because some arsenic will be removed through filtration/ neutralization and any remaining dissolved arsenic will be similar in concentration to the reduced environment within the IRZ. Any soluble Cr(VI) that remains will be immobilized by the IRZ.		Comment resolved.		Comment resolved.	Not applicable
619	DOI-250	Section 6.1.3.1, Page 6-4	Figure 6.1-2	Suggest including the following revisions for clarification: • Top Row – After "To Off-Site Disposal or Treatment Facility" add the phrase "as a RCRA or non-RCRA hazardous waste" • Rows 2 and 3 – Add As < 5mg/L to the boxes showing Cr < 5 mg/L • Indicate the effluent from the conditioning plant goes to the IRZ injection wells (if this concept is still viable)	See updated Figure 6.1-2 (**Attachment M**, at the end of this table).		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 6.1 Figure 6.1-2.

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				• Last Row – After "To Off-Site Treatment Facility add the phrase "as a non-hazardous waste" • TU note – Add a discussion of filtering (which may require additional revisions to the figure)						
620	DTSC-185	Appendix L O&M Plan Volume 1 6.1.5 Disposal Facilities, Page 6-5	Wastes designated as RCRA or Non-RCRA hazardous wastes will be transported to and disposed of in a Class I hazardous waste land disposal facility that is approved by the appropriate state environmental official in the receiving facility's state as well as the DOI Project Manager.	Please list the actual disposal facilities that may be used so that DTSC can ensure they are properly permitted or are appropriate for the specified waste stream.	Potential disposal facilities will be identified and included in the 90% design.	Okay pending verification of permit status.			Comment resolved.	O&M Manual Volume 1 Section 6.1.5.
621	DTSC-186	Appendix L O&M Plan Volume 1 6.2 Recoverable Materials, Page 6-6	Exhibit 6.2-1 Concrete – Processed Deliver to onsite crushing plant for processing and staging for future us as road base	Provide details regarding an onsite concrete crushing plant. Where is it to be located? Does one already exist? What is the anticipated operational duration during final remedy construction and implementation?	This option is listed as typical recycling option in the industry for onsite processing of concrete. There is no existing crushing plant onsite. Until the remedy features and locations are settled, it is not possible to evaluate the viability of this option at Topock. If determined viable, PG&E will provide additional information at 90%.	As a design document, if PG&E has not concluded on the viability of this option, the statement should not be included. PG&E should flag this as addition to infrastructure from EIR remedy concept if determined to be viable at 90% design.			Comment resolved.	O&M Manual Volume 1 Section 6.2. The option of onsite concrete crushing was removed after further evaluation.
622	DOI-251	Section 7.1, Page 7-1	"In compliance with the EIR mitigation measures HYDRO-1, HYDRO-2, and HYDRO-3 (DTSC 2011), . . . "	It is important to reference ARAR 34 (Federal Water Pollution Control Act) with respect to the SWPPP, BMP Plans, and monitoring plans (the actions taken to comply with this ARAR).	The following text will be added to Section 7.1 (page 7-1): "In compliance with the EIR mitigation measures HYDRO-1, HYDRO-2, and HYDRO-3 (DTSC 2011) <u>and Federal Action-Specific ARAR #34 (DOI 2010)</u>, …" The following text will be added to Appendix E, Section 1.0 (page E-1): "In addition, mitigation measures (HYDRO-1, HYDRO-2, and HYDRO-3) set forth in the certified EIR (DTSC		Comment resolved.		Comments resolved.	O&M Manual Volume 1 Section 7.1

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					2011) and Federal Action-Specific ARAR #34 included in DOI's ROD (DOI 2010) requires…"					
623	DTSC-187	Appendix L O&M Plan Volume 1 7.1 Storm Water Pollution Prevention, Page 7-1	Please note that the remedy design has and will continue to incorporate engineering elements to reduce or prevent pollutants from being released in storm water discharges (e.g., install overhead protection for areas where hazardous materials are stored/ handled, collect and route all stormwater discharges to the TCS evaporation ponds).	As the TCS evaporation ponds are being utilized as part of the remedy, Regional Water Quality Control permits/WDRs/monitoring program, etc., and any other related permit/requirements associated with the ponds should be included in the design document.	Comment noted. The regulatory framework for the disposal of remedy-produced water in the TCS evaporation ponds will be included in the 90% design. PG&E has and will continue to coordinate with the RWQCB on the permitting/requirements associated with the use of the TCS evaporation ponds as part of the remedy. The substantive requirements for use of the ponds will be summarized in the 90% design documents. Any permitting requirements will also be included.	DTSC is unclear of the meaning "regulatory framework." This could imply a simple statement of the oversight agency and the regulatory sections that covers the discharge. DTSC is more interested in the specific discharge limits and the compliance constraints. Comment resolved.			Comment resolved.	PG&E is coordinating with the RWQCB regarding substantive requirements applicable to the use of the evaporation ponds at PG&E Topock Compressor Station for disposal of certain remedy-produced water streams
624	DTSC-188	Appendix L O&M Plan Volume 1 7.2 Hazardous Material Management, Page 7-2		Clarify where hazardous waste will be stored, especially since the current Hazardous Waste Storage Building is planned to be removed for placement on Influent Water Storage Tanks? A replacement Hazardous Waste Storage Building for existing compressor station waste is no longer in the 60% as it was in the 30%. A figure illustrating where hazardous waste will be stored on and offsite should be included in this section.	See response to comment #35 DOI-12.	Okay pending review of the HW storage location on site.			Comment resolved.	O&M Manual Volume 1 Section 7.2. O&M Volume 4 Section 2.4.
625	DOI-252	Exhibit 7.4-1, Page 7-4		One of the Effective BMPs included in the exhibit describes the stabilization of disturbed areas with approved soil stabilizing agents. Please provide the list of "approved agents" for consideration in the remedy design package.	Comment noted. This information will be included in the 90% design and Construction/ Remedial Action Work Plan.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 1 Exhibit 7.4-1 Footnote 2.

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626	DOI-253	Section 8, Page 8-1		Although present in the Reference list, the CH2M HILL 2012 citation is not found in the text. Should the item be removed from the Reference list?	This item will be removed from the Reference list.		Comment resolved.		Comment resolved.	O&M Manual Volume 1 Section 8
627	DOI-254	Appendix F, Page F-1	"The handling and management of hazardous materials within the remedy facilities . . . "	Please indicate when the Compressor Station HMBP and the separate HMBP for management of hazardous materials outside of the TCS will be provided.	As reported in the Action column of Table L1.1-2 (Summary of Compliance with ARARs) for ARARs #90 and 91, an outline of the HMBP is included in the 60% design submittal. Drafts of the complete documents will be provided in the 90% design.		Comment resolved.		Comment resolved.	See Appendix E of O&M Manual Volume 1 for existing HMBPs.
628	DOI-255	Appendix F, Pages F-1 and F-2		The section does not include reference to recordkeeping. Will recordkeeping be required?	The following text will be added to Appendix F: "**<u>5.0 Record Keeping</u>** <u>The following San Bernardino County CUPA HMBP guidelines for record keeping will be adopted for the project:</u> • A copy of the HMBP Plans will be kept on site. • The Cover Sheet, Business Activities Form, Business Owner/Operator Identification Form, and any other information that has changed is required to be updated by March 1 of every year. • The entire Business Plan will be reviewed and re-certified every 3 years. • The Plan will be revised within 30 days of change of: owner, business address, business name, emergency contact information, inventory, or other site conditions which may significantly impact emergency response (such as additional hazardous materials, increased quantities exceeding 50% of previously reported maximum quantity, and/or increased container sizes). PG&E will provide the revised Plan to the Agencies. <u>In addition, in compliance with</u>		Comment resolved.		Comment resolved.	Appendix F.

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					<u>Section XXV of the CD (DOI 2013), PG&E will maintain records for 10 years following receipt of certification of completion. At the conclusion of the record retention period, PG&E will notify DOI and DTSC in writing at least 90 days prior to the destruction of any records and will provide DOI and DTSC with the opportunity to take possession of any records.</u>"					
Specific Comments – Appendix L – Volume 2: Sampling and Monitoring Plan										
629	DOI-256	Section 1.0, Page 1-1	" . . . selected the final groundwater remedy to address chromium in groundwater at Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1 . . . "	For clarity, change "chromium in groundwater at" to "chromium in groundwater resulting from discharges to".	The text will be revised as follows (inserted text shown in <u>underline</u> typeface and deleted text shown in ~~strikethrough~~ typeface): "to address chromium in groundwater <u>resulting from discharges to</u> ~~at~~ Solid Waste Management Unit (SWMU) 1/Area of Concern (AOC) 1 and <u>within</u> AOC 10 (DOI 2010 and DTSC 2011)".		Comment resolved.		Comment resolved.	O&M Manual Volume 2 Section 1
630	DTSC-189	Appendix L O&M Plan Volume 2 1.0 Introduction, Page 1-1	The monitoring program will have several components: compliance monitoring, process control monitoring, and constituents of potential concern (COPCs) monitoring.	It's important that the introduction provide a straight forward reason(s) for conducting monitoring. Therefore it is suggested that the cited sentence be followed with the following sentence or similar language: "These different programs will monitor the effectiveness of the remedy and track the groundwater contaminant plume over time. Monitoring will also be used to make sure that the neighboring ground and river water are not adversely affected by the remedy."	The following will be added after the cited sentence: "These different monitoring program components will be used to evaluate remedy effectiveness and implementation, and to monitor contaminants in groundwater over time. Monitoring will also be used to ensure that the groundwater contaminant plume does not permanently expand or adversely impact potential receptors."	The highlighted statement is a short and long term remediation goal that DTSC considers to be important prior to compliance with the RAOs for the remedy. Comment resolved.			Comment resolved.	O&M Manual Volume 2 Section 1
631	DOI-257	Section 1.1, Page 1-1	"The RAOs for the groundwater remedy are: . . . "	Recommend adding the following RAO: "Monitor on-going operations in order to improve and enhance treatment programs, expediting remediation in an environmentally, cultural, and cost-effective manner."			DOI withdraws this comment		Comment resolved.	Not applicable
632	DTSC-190	Appendix L O&M Plan Volume 2 1.2.2 Adaptive Operations Approach, Page 1-2	In the field, variations in Cr(VI) concentration distributions, lithology and hydrogeology	The adaptive approach clearly and understandably includes design uncertainty including well locations. For this reason, DTSC requests that the potential need for additional provisional wells be acknowledged in the design document beyond what is	See also response to comment #225 DTSC-98. The potential need for additional provisional wells (beyond those that have currently been identified) will be acknowledged in the design document. The borehole count will be updated in the 90%	DTSC agrees that maintaining the total well count as originally conceived is desirable. However, to realistically account for the unknowns and uncertainties, DTSC believes a larger set of			Comment resolved.	O&M Manual Volume 2 Section 1.2.2

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			will be encountered. To deal with the uncertainty in these parameters in implementation, the remedial system was designed to be flexible and the remedy will be implemented with an adaptive operational strategy. During system installation and baseline sampling, additional data will be collected that will refine the current conceptual model. Where appropriate, the data may be used to refine the design, for example of remedial well screens and perhaps locations. The data will also be used to update the solute transport model and refine remedy projections. During remedy implementation, monitoring data will be collected and used to guide the operations of the system, including changes in operational	currently identified. Perhaps a percentage of the total number of new wells can be used for this additional provisional well count for the anticipated 30 to 40 years of remedy operation and monitoring. DTSC fully understands the need to minimize the number of wells on this site to address tribal concerns, but the ability to properly develop and monitor the remedy when dealing with unknowns/ uncertainties must also be realistically addressed.	design.	contingency wells need to be specified to minimize future delays associated with additional environmental assessments. It would be preferable to include this concept in the 90% design. These wells may not be needed at all, but can be used to account also for difficulties that may be encountered while installing multiple screens per borehole. Comment resolved pending review of the 90% design.				

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			flow rates, injection parameters, and potentially well locations. This monitoring program provides a plan for data collection, interpretation, and guidance for adapting operations as the remedy is implemented.							
633	FMIT-171 Hualapai-123 Chemehuevi-123 Cocopah-123 CRIT-123	Append L2- V2 1.2.2 p.1-2		The adaptive management concept is useful as it allows data to continually benefit and refine the operation of the system as the data is collected. Is there also a concept of modifying the monitoring program based on knowledge gained as the remedy is operated? If so, what would be the means of communicating possible changes in the monitoring program?	Yes, it is anticipated that the monitoring program may need to be refined as information is gained during remedy construction, start-up, and routine operation. As indicated in Section 2, including footnotes to Tables 2.1-2 and 2.1-3, the sampling program will be re-evaluated after two years of operation. However, modifications to the sampling program may be recommended sooner based on the results of monitoring within the first two years. Changes to the monitoring program will either be included within the quarterly monitoring report as recommendations for future monitoring ("Section 6: Recommendations" section; see Exhibit L2.2-4 in Appendix L), or included within a separate proposal submitted to the agencies. This section will be updated with a reference to Section 6.5 (Reporting). Section 6.5 will be expanded in the 90% Design Submittal to discuss how proposed changes to the monitoring plan and proposed operational adjustments will be communicated.			Comment resolved pending review of 90% design.	Comment resolved.	O&M Manual Volume 2 Section 2
634	DOI-258	Section 2.0, Page 2-1	"For the remedy, the decision rules are effectively an adaptive operations framework that outlines . . ."	The text in Section 2.0 does not indicate the frequency of data interpretation and determining the need for operational adjustments. Please add a statement addressing this in the second paragraph.	The following text will be added to Section 2.0: "Data from the monitoring programs will be received on a schedule indicated by the monitoring frequency outlined in Table 2.1-2. These data will be interpreted as they are received to inform any potential modifications to system operations."		Comment resolved.		Comment resolved.	O&M Manual Volume 2 Section 2

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					As detailed in Section 6.5 and Section L3.3 and Exhibit L2.2-4 of the Main Body of Appendix L, quarterly reports will be submitted with sampling results, interpretation of the results and an interpretation of progress toward RAOs.					
635	DTSC-191	Appendix L O&M Plan Volume 2 2.0 Monitoring Goals and Data Quality Objectives, Page 2-1	• Problem statements and decision statements (Section 2) • Inputs to the decisions and study area boundaries (Sections 3 and 4) • Decision rules (Section 2) • Limits of decision errors and optimization of design for data collection (Sections 3 and 4)	It is not clear what sections (in parentheses) are being referenced in the cited text. This is an issue in other sections of this volume. Please clarify/revise throughout the entire volume if appropriate. For example, Section 3.0 discusses Remedy Compliance Monitoring and does not mention decision error or study area boundaries.	In the 90% design, the text throughout the volume will be revised to use the DQO language (problem statement, study area, etc.) to clarify how each of these are defined in the referenced sections.	Okay.			Comment resolved.	O&M Manual Volume 2 Sections 2.1, 3.1, and 4.2
636	DTSC-192	Appendix L O&M Plan Volume 2, Compliance DQO-1 (RAO 2) Page 2-1	RAO 2 will be satisfied during remedy operation by the in-situ treatment of Cr(VI) in groundwater; the treatment will minimize and prevent Cr(VI) and Cr(T) from reaching the Colorado River.	This section should acknowledge that in-situ will not be able to clean up the downgradient chromium contamination in the floodplain during startup of the remedy and that enhanced floodplain and river monitoring should be conducted during startup until river bank extractors are turned on and running and properly affecting hydraulics in the area.	The following text will be added to this section: "During initial start-up of the NTH IRZ prior to operation of the River Bank Extraction Wells, Cr(VI) in the floodplain downgradient of the NTH IRZ will not be treated. Modeling results indicate that operations of the NTH IRZ during this period are protective of the Colorado River—i.e., the Cr(VI) plume does not migrate a significant distance in the floodplain during start-up, and the portion of the plume located downgradient of the NTH IRZ does not migrate past the capture zone of the River Bank Extraction Wells. To verify these predictions, quarterly sampling of the NTH IRZ downgradient monitoring well network and the river sampling locations will be conducted, as indicated on Table 2.1-2."	Comment resolved.			Comment resolved.	O&M Manual Volume 2 Section 2.1
637	DTSC-193	Appendix L O&M Plan Volume 2, Compliance	Although RAO 2 is specifically intended to address Cr(VI),	First, it should be clarified in the text that since river chromium concentrations are generally not detected, remedial system operations	The underlined text will be added to the first sentence of the second paragraph under this DQO: "If Cr(VI), arsenic, or manganese	Okay.			Comment resolved.	O&M Manual Volume 2 Section 2.1

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		DQO-1 (RAO 2), Page 2-1	the IRZ by-products arsenic and manganese will also be monitored. The surface water quality criteria for Cr(VI) is 11 µg/L and 150 µg/L for arsenic (Source: Table 2 of the Record of Decision [ROD], ARAR #3, Federal Water Pollution Control Act. 33 USC 1251-1387, 40 CFR 131.38).	would be modified should any chromium (or byproduct or COPC) start to be detected in the river that was attributable to remedy operations. It appears the DQO in Table 2.1-1 captures this issue for chromium, arsenic and manganese. Recommend adding the chromium plume co-constituents nitrate, selenium, and molybdenum to this DQO as, like arsenic and manganese, will be monitored as part of river protection.	concentrations increase in surface water samples, or are detected at locations that were previously non-detect, and are attributable to the Topock site, operational changes will be implemented per the process control decision rules outlined in Section 3." Surface water sampling for COPCs is specified in Section 5.1 of the Sampling and Monitoring Plan (Volume 2 of the O&M Manual).					
638	FMIT-172 Hualapai-124 Chemehuevi-124 Cocopah-124 CRIT-124	Append L2- V2 2.1 p. 2-1, last para	*If Cr(VI), arsenic or manganese concentrations increase in surface water samples and are attributable to the Topock site…*	Pilot test data indicate that the potential for increases in byproducts is greater with the concentration of the carbon amendment applied. If successful treatment of Cr(VI) in the IRZ requires significantly higher amendment concentrations than originally anticipated, would there be an increase in the frequency of monitoring for possible byproducts?	The monitoring frequencies proposed in the Sampling and Monitoring Plan are not dependent on the concentrations of carbon used. Rather, they were designed to adequately monitor the response to carbon amendments regardless of what the response may be based on time for changes to occur due to reaction and transport. Although byproduct concentrations may increase with higher amendment concentrations, byproduct generation rates and transport times will still be adequately assessed with the proposed monitoring schedule.			Comment resolved pending review of 90% design documents.	Comment resolved.	Not applicable
639	DOI-259	Section 2.1, Page 2-2	Tables 2.1-2 and 2.1-3	Recommend adding a column providing the model layers that are monitored for each well. This would be useful in evaluating the vertical as well as the horizontal monitoring coverage provided by the wells.	Columns indicating screen intervals and model layers intersected by screened intervals for each monitoring well will be added to Table 2.1-2 in the 90% Design Submittal. This information will likely not be added to Table 2.1-3 in order to avoid redundancy and complexity in the table.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Section 2.1 O&M Manual Volume 2 Table 2.1-2
640	DOI-260	Section 2.2, Page 2-2	General comment	The text and Figure 2.2-2 make reference to Table 2.2-1 for anticipated time frames for Cr (VI) attenuation to assist in evaluating the need for operational changes. Many of these ranges are relatively wide so they do not have much utility as a decision criterion. Please clarify.	The timeframe ranges for Cr(VI) attenuation will be re-assessed based on model results and tighter timeframes provided in the 90% Design Submittal. The narrower ranges will provide a more meaningful basis for assessment of operational changes.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Section 2.2.1 O&M Manual Volume 2 Tables 2.1-4 and 2.1-5

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641	DTSC-194	Appendix L O&M Plan Volume 2, Compliance DQO-2 (RAO 3), Page 2-2	…and concentration trends will be reviewed to assess progress toward this RAO. Cr(VI) concentration trends will be evaluated and model projections compared to baseline estimates.	Provide details of how this assessment is to be conducted. Reference specific sections if necessary. Same for the other DQO/RAOs	The underlined text will be added: "…and concentration trends will be reviewed to assess progress toward this RAO, per the process outlined in IRL DQO-1 in Section 2.2.2 and Freshwater DQO-1 in Section 2.2.3. Cr(VI) concentration trends will be evaluated and model projections compared to baseline estimates, as summarized in Table 2.1-3." As noted in response to comment #673 DTSC-213, the estimated timeframes in Table 2.1-3 will be updated in the 90% design. The DQO/RAO section will be reviewed and similar references added throughout the section to clarify where evaluation processes are specified in the 90% design.	Highlighted DQOs reference Table 2.2-1, but now there is also Table 2.1-3. See also response to comment #673 DTSC-213. Comment resolved.			Comment resolved.	O&M Manual Volume 2 Section 2.1
642	DTSC-195	Appendix L O&M Plan Volume 2, Compliance DQO-3 (RAO 4), Page 2-2	The data collected will be analyzed to ensure that the concentrations of Cr(VI) and remedy byproducts, specifically manganese and arsenic, do not permanently increase outside of the baseline Cr(VI) plume.	Also mention that other constituents will (e.g., COPCs) and may (e.g., unknown constituent concentrations originating from different waste streams injected into IRL wells) be monitored as part of this DQO.	A monitoring program for COPCs was specified in Section 5.1 of the Sampling and Monitoring Plan (Volume 2 of the O&M Manual). The COPC monitoring network was designed to track COPC concentrations in areas where they are currently elevated as well as in areas where they may be transported during the remedial action. A reference to Section 5.1 will be added to the text in the referenced section.	Okay, pending review of the new COPC monitoring program.			Comment resolved.	O&M Manual Volume 2 Section 2.1
643	FMIT-174 Hualapai-126 Chemehuevi-126 Cocopah-126 CRIT-126	Append L-Vol 2 Section 2.1 p. 2-2	*Cr(VI) concentration trends will be evaluated and model projections compared to baseline estimates. If the plume remediation timeframes are lengthened, operational changes will be evaluated and implemented to the remediation system, as*	It is not clear from this statement what thresholds will lead to an increase in remediation timeframes. Please provide specific details that allow a clear understanding of the concentrations/events that will result in increased remedial timeframes.	To clarify, PG&E does not intend to increase the remediation timeframe based on any particular criteria; rather, the observed remediation timeframe may prove to be longer than originally predicted by the model. If the remedy's projected timeline becomes extended with respect to Cr(VI) remediation (i.e., if the anticipated timeframes for removal of Cr[VI] as outlined in Table 2.1-3 are not matching observations), then operational adjustments will be made. The text in this section will be updated for the 90% design as follows: "As part of the data quality objectives for RAO 3, wells located within the plume boundary (defined			Comment resolved pending review of 90% design.	Comment resolved.	O&M Manual Volume 2 Section 2.1

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			presented in the process control decision rules/ operational framework in Section 2.2 and in the Contingency Plan.		by the current 32 µg/L Cr[VI] plume boundary) will be monitored for Cr(VI), and concentration trends will be reviewed to assess progress toward this RAO. Table 2.1-3 includes anticipated timeframes for attenuation of Cr(VI) to below 32 µg/L for each inside-plume monitoring well based on the results of solute transport modeling. As the remedy progresses, if the observed concentration trends are not consistent with anticipated Cr(VI) attenuation timeframes (i.e., if the monitoring results indicate that Cr[VI] attenuation is actually taking substantially longer than anticipated), then operational changes to the remediation system will be evaluated and implemented as presented in the process control decision rules/operational framework described in Section 2.2 and presented in Figures 2.2-2 through 2.2-9. If operational adjustments are not successful in improving system performance, the Contingency Plan will be implemented, as described in Volume 3 of this Appendix."					
644a	FMIT-175	Append L-Vol 2 Section 2.1 p. 2-2	*Data will also be evaluated to determine when the appropriate time for monitored natural attenuation arises.*	Please provide more detail on how data will be used to indicate that MNA is appropriate. Once a decision is made that MNA is appropriate will the remediation system removal plan be designed? As you may recall, the Tribe supported NA and MNA as the primary final groundwater remedy.	This sentence will be revised to provide additional detail on how data will be used to assess the appropriate time for MNA: "Decisions on specific areas of the plume appropriate for MNA will be made based on: data collected under this DQO evaluating effectiveness of the active remediation systems for mass removal; the types and options for active remediation system adjustments; and the location of proposed MNA areas relative to natural reductive zones in the aquifer." In addition, reference will also be made to MNA language in the decision documents.			Comment resolved pending review of the 90% design.	Comment resolved.	O&M Manual Volume 2 Section 2.1
644b	Hualapai-127 Chemehuevi-127 Cocopah-127 CRIT-127	Append L-Vol 2 Section 2.1 p. 2-2	*Data will also be evaluated to determine when the appropriate time for monitored natural*	Please provide more detail on how data will be used to indicate that MNA is appropriate. Once a decision is made that MNA is appropriate will the remediation system removal plan be designed?	See response to comment #644a FMIT-175.			Comment resolved pending review of the 90% design.	Comment resolved.	O&M Manual Volume 2 Section 2.1

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			attenuation arises.							
645	DTSC-196	Appendix L O&M Plan Volume 2, NTH IRZ DQO-1, Page 2-3		The section summarizes the overall approach. Please add references to text (pages/sections), figures and tables so that the details (e.g., sampling points, frequency, constituents) of the sampling can be understood quickly. Ensure this is addressed for all DQO summaries.	References to relevant sections of Appendix L, Sections 3 and 4 (including references to sampling frequency tables and decision rule figures) will be added to the text for each DQO in the 90% Design Submittal. These references will also be provided in DQO Table 2.1-1, as indicated in the response to comment #671 DTSC-211. In addition, a figure will be prepared for NTH-DQO-1 to show sampling locations for the 90% Design Submittal.	Okay.			Comment resolved.	O&M Manual Volume 2 Sections 2.1, 2.2.1, 2.2.2, and 4.2.8 O&M Manual Volume 2 Table 2.1-1
646	DTSC-197	Appendix L O&M Plan Volume 2, NTH IRZ DQO-2, Page 2-3		DTSC requests that a detailed assessment of the monitoring program layout (selected wells) be conducted and documented in the design document. First, the vertical dimension of aquifer monitoring should be assessed and documented. It is suggested that cross sections along the NTH and shoreline be prepared showing monitoring well screens in relation to extractors and injectors (this should be done for all monitoring programs/subprograms). The chromium plume should also be placed on these cross-sections. Particle tracking (both outside and inside the plume), as was done in the 30% design, must be carried forward to assist in assessing program adequacy. If additional wells are needed, they should be called out along with the basis for adding the well. As example of this assessment, DTSC notes a likely problem with monitoring in the vicinity of IRZ-37 and IRZ-39. First, wells MW-23-060/080 are contaminated by grout and should be replaced if they cannot be rehabilitated. Well MW-21 is a very shallow well (it monitors the top 9 to 10 feet of the aquifer) and exhibits unusual/poor hydraulics as noted via muted pressure transducer data responses. Well MW-22 is a very shallow (11 feet deep) hand dug well completed in saline water (~20,000 ppm TDS) that monitors the top five feet of the aquifer. It would seem	Information on the vertical coverage of monitoring was presented in Table 3.6-1, which provided information on saturated thickness and potential number of monitoring well screens and lengths. As requested in this comment, cross-sections with monitoring well intervals posted for each monitoring program will be prepared and included in the 90% design (also included in **Attachment Q**, at the end of this table). Regarding particle tracking: particle flow paths are representative of a particle of water, while the solute transport model incorporates the behavior of the byproducts. Transport modeling is a superior tool for assessing remedy performance and designing the monitoring program. However, simulated flow fields will be provided to illustrate the simulated groundwater flow directions (included in **Attachment E**, at the end of this table). The flow fields are consistent with the simulated hydraulic capture zones presented in Appendix B, Section 6.5 and Figures 6.5-9 to 6.5-12. See response to comment #672 DTSC-212 in regards to MW-23. The saturated thickness of the aquifer is relatively thin in the area of MW-21 and MW-22 (i.e., approximately 10 feet). Thus, it is	Cross-sections for vertical layout: Comment resolved pending review of the 90%. However, the cross-sections should be provided prior to the 90% to allow for accelerated review/assessment of the monitoring programs. Particle tracking: Note: Figures for each layer should be prepared for the 90% design document. Early submittal requested as above. DTSC is concerned that the chemistry and water level data from MW-23 may not be representative due to grout contamination. Standard practice for well construction is to avoid grout contamination due to adverse impacts such as causing dissolved metals to precipitate from solution. Grout could certainly seal bedrock fractures and adversely impact hydraulic data as well. It may turn into a significant research project to assess the worthiness of the data from MW-23 cluster for hydraulic data and chemistry (e.g., every constituent sampled from this			Comment resolved. Per DTSC request, particle track figures for Layers 1-4 were submitted to DTSC on March 11, 2014 (see **Attachment R** at the end of this table). DTSC will continue to assess the monitoring program and provide any further input.	O&M Manual Volume 2 Table 2.1-2

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				that at a minimum, a deeper well is needed in the vicinity of MW-22 to monitor potential escape of contamination in the vicinity of the bedrock/alluvial interface. DTSC will continue to assess the monitoring programs after the requested information has been provided.	anticipated that shallow wells, such as MW-21, will be sufficient to monitor groundwater in this area. At the location of MW-22, a deeper boring and replacement monitoring well will be constructed if the alluvium is deeper in that area. The basis for the monitoring well locations is provided in this Appendix in Sections 3.1 and 4.2.1. MW-21 is designated an NTH dose response well. The general scheme for monitoring of the NTH IRZ was to place dose response monitoring wells in approximately half of the spaces between injection wells, and new monitoring well clusters were proposed in those locations. The placement in every other space allows for data collection along the full extent of the IRZ, balancing data density with infrastructure requirements. In places where existing wells were already present that could supplement the network, such as MW-21, the existing wells were added into the program. However, because multiple NTH IRZ dose response wells, staggered throughout the NTH IRZ line, have been identified for inclusion in the monitoring program, the removal of MW-21 from the monitoring program is not anticipated to result in a significant monitoring gap. For example, proposed monitoring well G will suffice as a dose response well for the southern portion of the NTH IRZ line.	well) and the data would need to be flagged appropriately. The well has certainly been compromised as evidenced by grout contamination (high pH) during well construction/ reconstruction. DTSC regards MW-23 as a significant monitoring point based on historical data (e.g., high chromium data) as well as its current isolated location with respect to the river and remedy components. DTSC requests that the wells be rehabilitated and replaced if rehabilitation fails to remove grout impacts. Aquifer thickness: DTSC is unsure of the actual aquifer thickness in the area based on data contained within existing PG&E reports and is a topic of concern. Aquifer thickness near MW-21 (along the end of the road) should be assessed during installation of IRZ 35, 37, and 39 and Well G. Aquifer thickness near MW-22 is not certain. Figure 2-3 and 2-4 of the RFI Volume 2 Addendum suggest if may be on the order of 30 to 50 feet and should be thicker than at Well G - saturated thickness of 32 feet (see Table 3.6-1). A deep exploration boring is requested at or near MW-22 to assess aquifer thickness. A well should be constructed at the bedrock/alluvial contact if the alluvium thickens as depicted in RFI figures. MW-21: DTSC concurs that proposed new Well G should suffice for dose response monitoring in the immediate area and that MW-21 can act to supplement shallow monitoring.				
647	DTSC-198	Appendix L O&M Plan Volume 2, NTH IRZ DQO-2, Page 2-3	Cr(VI): the presence or absence of Cr(VI) in groundwater will also serve	Add some cautionary text that the lack of chromium does not necessarily mean that treatment is occurring or that the area is not important. Fluctuations in chromium concentrations as the plume is	The following text will replace the last sentence in the second paragraph under the NTH-DQO-2 discussion: "It is important to note that, although Cr(VI) concentrations will be used as a line of evidence for	Okay.			Comment resolved.	O&M Manual Volume 2 Section 2.2.1

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			as a direct indicator of whether Cr(VI) treatment at a given location is occurring or necessary.	extracted and injected and pushed around should not be unexpected. Simple fluctuations in river stage can make chromium disappear for months only to return later. As with any assessment, multiple lines of evidence should be gathered and evaluated.	establishment of a treatment zone, decreases in dissolved Cr(VI) alone in the short-term are not necessarily a definitive metric for treatment. Multiple lines of evidence will be used to evaluate the establishment of the treatment zone, including the following:"					
648	FMIT-180 Hualapai-131 Chemehuevi-131 Cocopah-131 CRIT-131	Append L2- V2 Sect 2.2 p. 2-3	*Once the system operations are verified, sampling frequency will be reduced to quarterly or semi-annually…*	If sampling is reduced to semi-annual, one option to consider is to collect a subset of the data on alternating time periods, such that half of the wells are monitored each quarter. This provides some data each quarter without increasing the overall monitoring.	PG&E agrees that this is a good suggestion. The following text will be added to this paragraph in the 90% design submittal: "Once the system operations are verified, sampling frequency will be reduced to quarterly or semi-annually. If semi-annual monitoring is proposed, sampling events may be performed on a quarterly basis, with half of the injection well vaults sampled on alternating quarters. This would ensure that information on the system is collected quarterly, even if any given injection vault would only require semi-annual sampling."			Comment resolved pending review of 90% design documents.	Comment resolved.	O&M Manual Volume 2 Section 2.2.1
649	DOI-265	Section 2.2.1, NTH IRZ DQO-2, Page 2-4	"Selection of a carbon substrate with slower degradation rates could increase the distribution distances."	Please provide examples of carbon substrates that have slower degradation properties.	More complex substrates, such as whey and molasses, tend to have slower degradation properties. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Section 2.2.1
650	DOI-266	Section 2.2.1, NTH IRZ DQO-2, Page 2-4	"It is anticipated that the IRZ operations will be cycled; for example the IRZ would be operated for six months to establish reducing conditions . . ."	As the project moves forward, field data may suggest that the system operation, dosage, and other factors need to be adjusted to establish an effective reducing environment. Will the six month time frame for operation be modified based on field data, increasing or decreasing as needed?	Yes. The remainder of the paragraph from which this statement was taken describes how redox parameters, Cr(VI) concentration, and other indicators including iron, nitrate, and sulfate, will be used to assess residual reducing capacity. As shown in Figure 2.2-2 (referenced in this paragraph), IRZ operations will be cycled based on these results.		Comment resolved.		Comment resolved.	Not applicable
651	DTSC-199	Appendix L O&M Plan Volume 2, NTH IRZ DQO-4, Page 2-5		There is some concern that the plume could migrate to the north between MW-35 and MW-41. It is proposed that a monitoring well location be established between these two monitoring areas in Bat Cave Wash just prior to reaching the tamarisk. This well would provide hydraulic and chemical data to ensure appropriate	PG&E is currently evaluating potential locations for installation of an additional monitoring well to the northwest of MW-35, between MW-35 and MW-41. This monitoring well will be added to the Sampling and Monitoring Plan (Volume 2 of the O&M Manual) for the 90% design.	Comment resolved pending review of the 90% design.			Comment resolved.	O&M Manual Volume 2 Figures 2.1-1, 2.1-2, and 2.2-1

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				capture. This location might also be used to monitor effects of freshwater injection. A back up location could be cited at the old Workman's resort area.						
652	DOI-267	Section 2.2.1, NTH IRZ DQO-5, Pages 2-5 and 2-6	"These operational adjustments, including the shutdown of any given injection or extraction well, would be coupled with an assessment of the strength of the IRZ and Cr(VI) treatment in that area per NTH IRZ DQO-2."	Will an analysis be performed to ascertain what impact, if any, shutting down an extraction or injection well will have on the capture zone?	Such an analysis will be performed with groundwater modeling prior to shutting down an extraction well. After shutting down such wells, lines of evidence will be used as part of the plume control assessment required under IRL-DQO-3 and IRL-DQO-4, including water level data, chromium concentration data, and modeling, as described in Section 4.3, Volume 2 of the O&M Manual (Appendix L), pp. 4-6 through 4-10.		Resolved.		Comment resolved.	Not applicable
653	DOI-268	Section 2.2.2, IRL DQO-1, Page 2-6	"Observed hydraulic gradients will be compared to anticipated gradients as simulated with flow modeling that will be periodically updated as field data are collected."	When does PG&E plan on updating the computer model runs to reflect existing conditions under full remedial systems operations?	There are several checkpoints during remedy implementation when the groundwater flow and solute transport model may be updated, including during installation, after system start-up, and during remedy operation. During the installation phase the model may be updated, if the data collected during construction significantly contradict the current CSM. For example, if large variations in saturated aquifer thickness, bedrock extent, permeability, chromium distribution, etc. are measured compared to what has been modeled to date, the model would be updated and re-run. The regional model would be updated first, then imported into the fate and transport submodel before transport runs are conducted. During remedy well testing and system start-up, information will be gathered about achievable flow rates for the remedy wells and system as installed and actual hydraulic gradients. That information will be fed back into the model and additional predictions will be made. As remedy implementation progresses, the observed data will		Comment resolved.		Comment resolved.	Not applicable

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					become more useful than model predictions and the modeling will be relied on less heavily. If actual data collected contradicts geochemical or solute transport parameters used in the modeling, it may be appropriate to update and re-run the model simulations.					
654	DTSC-200	Appendix L O&M Plan Volume 2, IRL DQO-1, Page 2-6	The process for evaluating the development of hydraulic gradients to facilitate Cr(VI) plume flushing is illustrated on the right-hand side of the flow diagram in Figure 2.2-4.	Figure 2.2-4 seems to only tie hydraulic assessment with anticipated chromium concentration trends. A separate hydraulic only assessment should be included in the figure/rule.	To assess whether the plume is being adequately flushed by operation of the IRL, Figure 2.2-4 has two branches on the right side of the flowchart. The first branch (Box 22) is for the case where it is early in remedy operations and not enough time has passed for Cr concentration changes to occur. Under this condition, the hydraulic gradient (i.e., water level) data will be evaluated and used with the model to evaluate whether the gradient is consistent with the desired remediation timeframe, as the commenter suggests is appropriate. To clarify, Box 23 will be revised to state: "Evaluate whether hydraulic gradients to facilitate flushing of the plume have been established, recalibrating the model with water level data, and projecting remedial timeframes as needed." Further into remedy implementation, changes in Cr concentrations are anticipated and evaluation of the concentrations becomes more important than the hydraulic gradient, as shown on the branch of the flowchart starting in Box 24. If Cr concentrations are not changing as anticipated, but the gradient is within expectations, action and adjustment still need to be made: this is why concentration trends become the more important indicator to evaluate as the remedy progresses.	Okay.			Comment resolved.	O&M Manual Volume 2 Figure 2.2-4
655	DTSC-201	Appendix L O&M Plan Volume 2, IRL DQO-1, Page 2-6	Observed hydraulic gradients will be compared to anticipated gradients as simulated with flow modeling that will be	Ensure that anticipated gradients for this and all DQOs are included in the 90%. Will specific well pairs be established similar to IM-3 hydraulic monitoring?	Remedy performance monitoring includes periodic assessment of the hydraulic gradient across the site via analysis of water levels measured in site wells. Water level contour maps, which take into account water levels measured in all wells relevant to the portion of the aquifer being assessed, will be used as the	In addition to what is proposed, gradient pair monitoring at critical areas should be developed and included in the 90%.			PG&E will work on items related to this comment as directed in the Agencies' direction letter dated April 4, 2014.	O&M Manual Volume 2 Sections 2.2.2, 2.2.3, and 4.3.3

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			periodically updated as field data are collected.		preferred method for assessing the hydraulic gradient. These maps are preferred over strictly well pair assessments because they are the result of the spatial integration of multiple water level data points. As discussed in Section 4.3.3.1 of the Sampling and Monitoring Plan (Appendix L, Volume 2), such contour maps will be constructed similarly to the maps presented in past quarterly and annual groundwater monitoring reports for the site. Thus it will not be necessary to establish specific well pairs to assess gradients. The 90% document will include a discussion of how the hydraulic control assessment will be performed using the multiple lines of evidence approach, and how the assessment will be an iterative process, consistent with the USEPA guidance document (2008). Also, a discussion will be included to show how the assessment might be summarized (i.e., in a table), illustrating conclusions from each of the lines of evidence used, with overall conclusions regarding hydraulic control, uncertainties and data gaps, and recommendations for future action. This discussion will be presented as an expansion of Section 4.3.4 of the Sampling and Monitoring Plan (Appendix L, Volume 2).					
656	DTSC-202	Appendix L O&M Plan Volume 2, IRL DQO-2, Page 2-6	If the carbon amendment system is active, data will be collected from the IRL injection dose response monitoring wells, listed in Table 2.1-2 and shown on Figure 2.2-1, to evaluate Cr(VI) treatment and by-product generation.	As the IRL wells screen the entire aquifer, it is requested that the neighboring CW wells be fitted with shallow zone monitoring wells. Cross sections of this area (and all critical areas) with remedial components displayed are requested. A deep well at MW-14 should be evaluated to determine if it would provide valuable hydraulic data (the deeper zone is contaminated in this portion of the plume so it would seem that monitoring that zone would be more important).	To strike a balance between data collection and minimizing monitoring well infrastructure, the monitoring network was designed to provide representative data throughout the remedial systems. In the case of the inner recirculation loop injection system, multi-depth monitoring wells were proposed near 2 of the 4 injection wells, i.e. proposed monitoring wells I, J, P and Q near IRL-1 and IRL-4, which are designated as outer plume compliance monitoring wells (Table 2.1-2). The preliminary design for I, J, P and Q includes 4 screen intervals to provide vertical coverage across the saturated thickness (Table 4.3-1). Additional monitoring wells with multiple screen intervals are also	Comment resolved.			Comment resolved.	Not applicable

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					being designed for arsenic monitoring. The data collected at proposed wells I, J, P and Q, and the arsenic monitoring network will be sufficient to bound and monitor the extent of Cr(VI) throughout the saturated interval.					
657	DOI-269	Section 2.2.2, IRL DQO-2, Page 2-7	"If injection well maintenance becomes unacceptably costly or burdensome due to the re-injection of reduced metals, treatment for removal of those metals prior to re-injection may be considered."	Should this occur, will the regulatory agencies and Tribal Nations be informed prior to commitment?	The text will be revised as follows (added text shown in underline typeface): "If injection well maintenance becomes unacceptably costly or burdensome due to the re-injection of reduced metals, treatment for removal of those metals prior to re-injection may be considered. Should this occur, the regulatory agencies and Tribes will be informed prior to commitment."		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Section 2.2.2
658	DOI-270	Section 2.2.2, IRL DQO-3 and 4, Page 2-7	"Operations may be improved by adjusting extraction rates or taking further contingency measures, such as adding additional extraction wells (see Volume 3, Contingency Plan)."	In order to assess potential impacts on controlling Cr(VI) and byproducts in the deeper units, will the flow model be run to measure potential impacts and addition of extraction well placement?	Yes, the flow model will be an integral part of the analysis used to assess the impact of these changes.		Resolved.		Comment resolved.	Not applicable
659	DTSC-203	Appendix L O&M Plan Volume 2, IRL DQO-3/4, Page 2-7		Note: DTSC desires to evaluate requested cross sections and particle tracking for the river bank and all areas.	Cross sections along the NTH IRZ and the shoreline will be produced to show monitoring well screens and chromium plume delineations (included in **Attachment Q**, at the end of this table). Particle flow paths are representative of a particle of water, while the solute transport model incorporates the behavior of the byproducts. Transport modeling is a superior tool for assessing remedy performance and designing the monitoring program. However, simulated flow fields will	Comment resolved pending review of the 90% design.			Comment resolved. Per DTSC request, particle track figures for Layers 1-4 were submitted to DTSC on March 11, 2014 (see **Attachment R** at the end of this table). DTSC will continue to assess the monitoring program and provide any further input.	O&M Manual Volume 2 Section 2.2.2

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					be provided to illustrate the simulated groundwater flow directions (included in **Attachment E**, at the end of this table). The flow fields are consistent with the simulated hydraulic capture zones presented in Appendix B Section 6.5 and Figures 6.5-9 to 6.5-12.					
660	DTSC-204	Appendix L O&M Plan Volume 2, IRL DQO-3/4, Page 2-7	Figure 2.2-5 14. Is Cr(VI) in the shallow unit controlled?	Change 14. to "Is Cr(VI) and/or byproducts in the shallow unit controlled?" Clarify in text and figure the need for hydraulic assessment of water level data to ensure appropriate capture/control is occurring. Also, discuss the need for additional extractors both shallow and deep (e.g., located between existing RB wells). Provisional well locations have not been called out.	As stated in Section 3.2.2.1 of the BOD/60% Design Submittal, the objectives of the River Bank Extraction Wells include: to control potential migration of Cr(VI) located downgradient of the NTH IRZ and to control byproduct migration in the deeper portion of the aquifer. Byproduct concentrations generated in the shallow unit are anticipated to be within the range of the naturally-occurring reducing rind that adjoins the Colorado River and therefore would not represent any additional threat to the river or be a target for capture. This is supported by the simulated solute transport results, which indicate that byproduct concentrations (manganese and arsenic) generated from the NTH IRZ are within the range of naturally occurring shallow manganese and arsenic concentrations in the floodplain. Shallow river bank extraction could have negative hydraulic impacts to the reducing rind. However, the shallow riverbank extraction will be added to the contingency plan as a potential option to address shallow byproduct concentrations significantly above naturally occurring concentrations and Figure 2.2-5 will be edited accordingly. Decisions on appropriate implementation of this contingency measure will be made based on evaluations of the water quality in the floodplain and/or the river, and of the remedy during implementation, weighing the need for capture with the potential negative impacts on the rind and remedy operations. Details of the hydraulic control evaluation are provided in Section 4.3 of this Volume (Volume 2 of the O&M Manual). A reference to this section will be added to Figure 2.2-5.	The figure needs to be revised to ensure that byproduct concentrations generated in the shallow unit are looked at and are within acceptable limits (i.e. naturally occurring concentration). If they are greater, then the figure should mention potential contingencies including bringing shallow river bank extractors online. Hydraulic control assessment: Concur with adding to figure. Add main applicable points if possible. Concur with Response to Comment 100 regarding provisional River Bank Extraction Wells.			Comment resolved.	O&M Manual Volume 2 Section 2.2.2 O&M Manual Volume 2 Figure 2.2-5

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					With regards to the need for additional extractors, see response to comment #100 DTSC-27. In addition, the River Bank Extraction Wells are designed with two screened intervals to allow for groundwater capture from both the shallow and deep units, if necessary. The shallow screens will be isolated from the well pump unless the need to pump in the shallow unit proves necessary.					
661	FMIT-176 Hualapai-128 Chemehuevi-128 Cocopah-128 CRIT-128	Append L-Vol 2 Section 2.1 p. 2-7	*IRL – DQO 5: The naturally occurring reducing rind will be monitored for changes in water quality.*	Which specific wells are intended to provide the data to monitor the reducing rind?	Generally speaking, the greatest emphasis will be placed on shallow monitoring wells within the NTH IRZ downgradient and riverbank extraction monitoring well networks (listed in Table 2.2-1), particularly those that fit the operational definition of the reducing rind as described in this paragraph and Appendix B, section 2.3. As is noted in the text, however, the entire monitoring data set (including historic data for existing wells and wells occurring outside of the reducing rind) will be considered when assessing reducing rind impacts. This will be necessary to provide the proper context on any apparent impacts for a given well in the network. For example, water quality may be highly variable in any given monitoring well in the floodplain, particularly when the flow regime is changed. Accordingly, changes in concentrations of redox parameters in any given well over a short timeframe may or may not be indicative of overall impacts to the reducing rind. This will need to be assessed within the context of the entire dataset. A discussion of these factors and a reference to Appendix B will be included for IRL DQO-5 in the 90% design submittal.			Comment resolved, provided further detail is included in the 90% design documents.	Comment resolved.	O&M Manual Volume 2 Section 2.2.2
662	FMIT-177 Hualapai-129 Chemehuevi-129 Cocopah-129 CRIT-129	Append L-Vol 2 Section 2.1 p. 2-7	*The entire dataset will be considered when evaluating the overall impact to the reducing rind, and*	Please provide additional detail on what further investigations may be conducted. Also if monitoring data indicate that reducing conditions in the rind are being negatively impacted will the river bank extraction wells be turned off until additional investigations have	The following text will be added as the second sentence to this section in the 90% design submittal: " The analytes in the groundwater are indicative of reducing conditions generated by the rind." In addition, the following text will be added at the end of this section in			Comment resolved pending review of the 90% design documents.	Comment resolved.	O&M Manual Volume 2 Section 2.2.2

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			multiple lines of investigation will be evaluated to understand the data trends. The presence and effectiveness of the engineered reducing zone will also be considered when evaluating changes to the natural reducing zone. If broad changes to the reducing conditions occur, further investigations may be warranted.	adequately characterized the potential impact?	the 90% design submittal: "The types of additional investigations conducted will be dependent on the nature of the observations. These additional investigations may include (but would not be limited to) supplementary groundwater sampling for additional analytes and/or increased monitoring frequency, installation of provisional wells, and/or sampling of aquifer solids and solid-phase analyses." Whether or not riverbank extraction will be shut down will be situational and will depend on the certainty of the data, the rate at which the reducing capacity of the rind may be decreasing, and the need for on-going operations of the riverbank extraction for hydraulic control. This is consistent with the adaptive operations approach.					
663	DTSC-205	Appendix L O&M Plan Volume 2, TCS DQO-1, Page 2-8	To evaluate treatment of Cr(VI) in groundwater beneath the TCS, data will be collected from the TCS Recirculation Loop dose response monitoring wells, listed in Table 2.1-2 and shown on Figure 2.2-1.	Include a dose response well for TCS-1. Can existing well TW-1 be utilized? Wells in Bat Cave Wash should be added to the TCS loop monitoring to ensure westward migration of the plume/byproducts is not occurring.	**Additional TCS-1 Dose Response Well:** In an effort to strike a balance between data collection and number of monitoring wells/ boreholes, a dose response well was proposed at only one of two of the injection wells for the TCS injection system. Including another dose response well in this area, where the injection wells are just approximately 300 feet apart, was not considered as valuable as the inclusion of multiple dose response wells in other areas, for instance along the NTH IRZ line where the injection wells cover a distance of approximately 3,000 feet. Well TW-1 was considered as a potential dose response well, but was originally not included in the program given that it has a screen length of 100 feet and was considered too long to provide useful information on reagent distribution and treatment from the approximately 40 to 50 foot long screen intervals of the TCS injection wells. TW-1 will be included in the 90% design monitoring program as an additional dose response well for	DTSC is alright with utilizing one dose response well provided TCS-1 and TCS-2 will always receive the same quantity and quality of injected water. If there is needed flexibility for varying the flow rates or quality of water received, then it would seem that separate dose wells are needed. During discussions with DTSC, PG&E indicated that they would check further into utilizing TW-1 with low flow monitoring methods. Regardless, attempts to use TW-1 should be included in the 90% and if it fails to provide valuable data, it could be dropped from the network in the future and replaced if necessary. Bat Cave Wash Wells- TCS Loop. Concur with proposal including adding byproducts to the three wells. How will this issue be linked in text/ table to know how to asses this item as part of monitoring? Add these			Comment resolved.	O&M Manual Volume 2 Section 2.2.3 O&M Manual Volume 2 Table 2.1-2 O&M Manual Volume 2 Figure 2.2-6

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					the TCS injection system with the following caveat: if sampling at TW-1 fails to provide adequate data, TW-1 will be removed from the monitoring program in the future and, if necessary, replaced. **Wells in Bat Cave Wash:** Monitoring wells MW-10 and MW-38S/D have been specified to the west of the TCS as inner plume compliance wells (Table 2.1-2 of the Sampling and Monitoring Plan) which are used to ensure that Cr(VI) concentration trends behave within expectations per Compliance DQO-2 (RAO 3) in Section 2.1 of the Sampling and Monitoring Plan. In addition, MW-9, located south of MW-10 and to the west of the TCS, will be added to the monitoring program network as an additional inner plume compliance well. Compliance wells MW-10, MW-38S/D, and MW-9 can also be monitored for byproducts to verify that westward migration of byproducts is not occurring. MW-9 will be added to the program in the 90% design. In addition, the 90% design Sampling and Monitoring Plan will be updated to include a data evaluation process to assess whether Cr(VI) and byproduct data indicate westward migration from the TCS Injection Wells.	wells to a TCS Loop column in Table 2.1-2. Comment resolved.				
664	DOI-271	Section 2.2.3, TCS DQO-2, Page 2-8	"If additional control is need, operational changes will be made such as increasing extraction rates or adding provisional extraction wells."	If extraction rates are increased, will provisions need to be made with regards to the injection system?	To the extent possible, the capacity of the two currently proposed TCS Injection Wells will be used to accommodate increases in extraction rates. The injection rates in these wells could likely be at least doubled in comparison to currently anticipated rates. Should the injection capacity of those two wells be exceeded, additional TCS Injection Wells would need to be considered along with increased extraction rates. Additionally, flexibility is included in the design to re-direct some or all of this flow to the NTH IRZ if needed or warranted.		Comment resolved.		Comment resolved.	Not applicable
665	DTSC-206	Appendix L O&M Plan Volume 2, TCS DQO-2,	Multiple lines of evidence will be used to evaluate and	The hydraulic control metric sought should be specified in the section and associated figure. Text referenced Section 4.4, but that	The correct reference for the lines of evidence to be used for the hydraulic control evaluation is Section 4.3, Volume 2 of the O&M Manual, pp. 4-	Ok pending review of the 90% design. See also response to comment #655 DTSC-201.			Comment resolved.	O&M Manual Volume 2 Sections 2.2.1, 2.2.2, 2.2.3, and 4.2.5 O&M Manual Volume 2 Figure 2.2-7

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		Page 2-8	optimize the hydraulic control of the Transwestern Bench extraction system, as outlined in Section 4.4 and shown on Figure 2.2-7.	section does not exist.	6 through 4-10. A reference to this section will be included on Figure 2.2-7.					
666	DTSC-207	Appendix L O&M Plan Volume 2, TCS DQO-2, Page 2-8	If additional control is need, operational changes will be made such as increasing extraction rates or adding provisional extraction wells.	Specify or reference appropriate sections discussing the basis for provisional wells and events that would trigger its installation. This applies to all provisional wells.	The events that would trigger installation of provisional wells are illustrated in the Decision Rules Framework laid out in Figure 2.2-7. The text in this section will be modified as follows: "If additional control is needed, operational changes will be made such as increasing extraction rates or adding provisional extraction wells (see Boxes 5 (short-term box 6 will be edited to Box 5) and 6, Figure 2.2-7). Increased extraction rates would be attempted in the short term, while addition of provisional extraction wells would be considered if short-term extraction rate increases were found to be insufficiently effective." Similar text will be added to other locations where provisional wells are described in the 90% Design Submittal.	Okay.			Comment resolved.	O&M Manual Volume 2 Sections 2.2.1, 2.2.2, and 2.2.3
667	DOI-272	Section 2.2.3, TCS DQO-3, Page 2-8	"The decision rules/ operational framework for the CS Recirculation Loop East Ravine extraction system are shown on Figure 2.2-8."	East Ravine extraction wells are completely in bedrock and will likely be operating at maximum capacity. Therefore, increasing extraction rates in the short term is not a plausible option.	Additional provisional extraction wells have been added in the East Ravine area (see response to comment #109 DTSC-30). Figure 2.2-8 and the associated text will be revised to reflect the likelihood that the provisional extraction wells, rather than increased extraction rates will be used for East Ravine adaptive operations.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Section 2.2.3 O&M Manual Volume 2 Figure 2.2-8
668	DTSC-208	Appendix L O&M Plan Volume 2, TCS DQO-3, Page 2-8		See comments above for TSC DQO-2. Due to the tight bedrock conductivities anticipated, it is requested that two additional monitoring wells be added to the program to assess hydraulic influence and plume control between extractors. Specifically, it is requested that two monitoring well locations be	Additional monitoring wells as requested will not provide definitive conclusions with regard to hydraulic influence. The water levels in such monitoring wells will be higher than the adjacent extraction wells, and such evidence will not lead to a conclusive assessment of hydraulic control. Also, the presence or absence of Cr(VI) in wells at the	See comment #109 DTSC-30 regarding potential provisional extraction wells along the East Ravine. PG&E needs to provide paired piezometers for this area requested of USEPA capture zone/pump and treat guidance to assess if extraction/capture			Comment resolved.	O&M Manual Volume 2 Section 2.2.3

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				added midway between ER-2/ER-3 and ER-3/ER-4. These wells/boreholes could potentially be converted into extractors if needed in the future.	requested locations will not lead to a conclusive assessment of hydraulic control. All of the monitoring wells (specifically wells at locations MW-62, MW-63, and MW-72 which are located in the proximity of the proposed extraction wells) as identified as East Ravine Extraction Monitoring Wells on Table 2.1-2, Vol. 2 O&M Manual, will be used in conjunction with the proposed extraction wells to assess hydraulic control by employing the lines of evidence, including water level data, chromium concentration data, and modeling, as described in Section 4.3, Vol. 2 O&M Manual, pp. 4-6 through 4-10.	is effective. Modeling is less valuable in the fractured bedrock setting. Comment resolved.				
669	DTSC-209	Appendix L O&M Plan Volume 2, Freshwater DQO-1, Page 2-8		The DQO will need to be modified to address the freshwater water quality criteria needed for injection (including input from the State Board). Discharge limits for a wide suite of constituents (metals/general minerals/TDS) should be developed for freshwater injection. The section will also need to identify wells for monitoring arsenic impacts around injection points should the State Board allow elevated arsenic to be injected into the aquifer. A distal outboard monitoring well has not been identified for FW-2 injection.	On November 20, 2013, the State Water Resources Control Board issued a letter regarding remedy requirements associated with injection of groundwater containing naturally occurring arsenic. A new DQO will be added to the 90% design in this freshwater injection section to include: the monitoring required by the State Board letter, to verify modeling results; and the actions specified should arsenic exceed water quality objectives at 150 or 225 feet. Additional specifications on freshwater water quality are not necessary, were not established by the State Board, and will not be included in the DQOs.	DTSC notes that the State Board letter was responding to an inquiry from PG&E on the injection of water with natural arsenic above California MCL. The absence of discussion regarding other constituents should not be considered a waiver to not consider other constituents that may be injected into the subsurface. Also, see response to comments 38, 145, and 181.			Discussion between DTSC, DOI, RWQCB, and PG&E is ongoing to resolve this comment. This topic will be carried forward. Resolution of this comment will be included in the 90% design. PG&E will also work on items related to this comment as directed in the Agencies' direction letter dated April 4, 2014.	O&M Manual Volume 2 Sections 2.2.4 and 4.2.7
670	DTSC-210	Volume 2	Table 2.1-1	Page 1: Column 7 indicates "See Section 3", but uncertain if this is a holdover from a previous internal draft version.	The references in Column 7 to Section 3 for compliance monitoring objectives and Section 4 for performance monitoring objectives are in fact intended for the reader, highlighting that design optimization details are covered in the text.	Okay.			Comment resolved.	Not applicable
671	DTSC-211	Table 2.1-1 Interior of the plume	If hexavalent chromium concentrations are not decreasing within expected timeframes, operational changes (potentially including the	Cite specific section/figure/ pages so that decision criteria are quickly linked to the DQO and understood.	References to relevant sections of Appendix L will be added to Table 2.1-1 for each DQO in the 90% Design Submittal.	Okay.			Comment resolved.	O&M Manual Volume 2 Table 2.1-1

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			addition of provisional IRZ wells) will be implemented per the process control decision rules.							
672	DTSC-212	Table 2.1-3		Include the following wells on the table: Outside Plume: MW-16[1], MW-17[1], MW-18, MW-22, MW-48, MW-62-190, MW-68BR-280, MW-72BR-200, OW-03S, OW-03M, OW-03D Inside the plume: MW-09, MW-24A, MW-60BR-245, MW-70-105, MW-70BR-225, 1 Consider utilizing as background/regional control well. Indicate why all PT wells/well clusters (PT1 through 9 including PTI wells) were not utilized. Same for not using any TW wells (TW-1 through TW-5). What purpose do these wells serve? Can wells PGE-7BR or PGE-8 be utilized for the remedy in any fashion? Update all tables to indicate if an outside plume well was historically contaminated (e.g., MW-14, MW-30-050, MW-31-135, MW-34-080, MW-35-060, MW-36-090, MW-39-050, MW-39-060, MW-39-070, MW-39-080, MW-47-055, MW-50-095, MW-58BR, MW-62-190). This list will hopefully grow over time and monitor remedy success and will also alert the reader to anticipate potential rebound, etc., in the future. Add an identifier to the Outside Plume wells in the “Currently-Anticipated Timeframe for Cr(VI) Concentration Changes” column that have had historic contamination, but are now clean. Assess if this should affect sampling frequency and make appropriate changes to sampling frequency. Note: Wells MW-23-060 and MW-23-080 have not recovered from grout contamination (elevated pH) and should be replaced if well rehabilitation measures do not improve the issue. Confirm the number of wells at	Monitoring wells MW-22, MW-48, MW-62-190, MW-68BR-280, and MW-72BR-200 will be added to the Outside Plume monitoring well network. Monitoring wells MW-09, and MW-60BR-245 will be added to the Inside Plume monitoring well network. The need to establish background or regional control with wells that are very far upgradient of the project, such as MW-16, MW-17, MW-18, and cluster OW-03 is not clear. Periodic sampling of these wells may be proposed in the future as the need arises, but specification of routine sampling of background/regional control wells is not currently necessary. MW-70-105 is included as an Outside Plume well. This well is screened in Model Layer 1 and does not exhibit Cr(VI) impacts, and therefore will remain in the Outside Plume well network. During final remedy construction, MW-70BR-225 will be converted into extraction well ER-6. As directed by the agencies, a deeper borehole is needed at this location to delineate the vertical extent of elevated Cr(VI) concentrations. As discussed with DTSC on November 21, 2013, in lieu of drilling an additional well, the additional characterization may be accomplished by deepening the existing MW-70BR-225 borehole. Depth-specific samples will be collected from the deepened borehole to assess Cr(VI) concentrations in permeable fractures encountered in the deeper portion of the borehole. After the	Outside: Okay Insider: Okay, but add MW-70-105 to inside as it is contaminated (see quarterly report). Control Well: Concur, but indicate how long it will take for injected water to reach these outer wells. Provide particle tracking figure to support this issue. Do make sure these wells are sampled during a baseline event prior to remedy start up. ER-6: Please recall that a deeper well/extension is required at this location.			Comment resolved.	O&M Manual Volume 1 Section 4.2 O&M Manual Volume 2 Tables 2.1-2 and 2.1-3 O&M Manual Volume 2 Figures 2.1-1, 2.1-2, and 2.2-1

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				location MW-45-095 (a & b wells) and the purpose of each and that tables appropriately reference them. Confirm in the table if well MW-53S is not operational (and any other inoperable wells). The current well designation for MW-58BR should be used noting that DTSC will likely request modification of the current well design. Same for MW-64BR. MW-70-105 is incorrectly identified as a clean, outside the plume well. Based on Q2, 2013 PMP/GMP report, this well contains Cr(6) at elevated concentrations. Please revise.	deeper characterization is complete (i.e., concentrations of Cr(VI) is not detected or are observed to decrease with depth), the MW-72BR-225 borehole will be converted to extraction well ER-6, screened to capture the elevated Cr(VI) concentrations observed shallower in the borehole and any additional zones of elevated Cr(VI) concentrations found in the deeper section. Most PT well clusters and MW-24A were not included in the monitoring program because these wells were influenced by pilot testing. Since pilot test activities created strong and persistent reducing conditions in the vicinity of these wells, they cannot be used with confidence to track Cr(VI) migration as a result of field implementation activities. Exceptions include those PT wells that were not influenced by pilot testing, including the PT-5 cluster, PT-9 cluster, and PT-8D, which have been retained in the monitoring program. The PT wells will be included in the table for periodic sampling. TW-1 has a 100-ft screen interval, which limits its usefulness in the monitoring program. See response to comment #663 DTSC-205. TW-2S/D, TW-3D, TW-4, and TW-5 will be considered for inclusion in the monitoring program as compliance and IRZ dose-response wells. PGE-7 will be added to the monitoring program. PGE-8 will be monitored in the short term for remedy effects. If there is no effect, then PGE-8 will be removed from the program unless it is yielding good information and can be retrofitted like PGE-7. The table will be modified for the	PT Wells/MW-24A: DTSC to confirm current condition. Sample to study byproduct persistence. Also plan to sample some of these wells after they rebound to baseline. TW-1: Attempt to use this well as a dose response well and inside the plume well. It is highly contaminated, even with its long screen. Other TW wells: Concur. PG&E-7/8: Monitor both periodically at beginning to confirm no changes/ effects from remedy implementation. Sample less frequent over time. Formerly contaminated wells:				

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					90% Design Submittal to include information on whether outside-plume wells were historically contaminated. Although it is not anticipated that this will have an impact on sampling frequency, the sampling frequency will be assessed based on this information. For the MW-23 nested wells, rehabilitation options to improve pH will be evaluated and implemented, as appropriate. The effects of pH on parameters specified in the monitoring program for this location will also be evaluated. If these evaluations indicate that the well is not suitable for the specified monitoring program, the installation of replacement wells in a new borehole in the vicinity of the existing MW-23 wells will be considered. As requested by DTSC, monitoring well acceptance criteria will be included in the 90% design (O&M Plan Volume 1, Section 4, Well Maintenance and Decommissioning) such that the potential pathways to monitoring well maintenance, reconstruction, or replacement is clear. The conditions that will be addressed include well collapse (preventing sample collection or compromising water quality), screen damage (resulting in elevated turbidity and/or sanding problems), and the effects of grout intrusion (resulting in abnormally high pH values). There are two casings at MW-45-095 (A and B). However, both wells are screened in the exact same interval, and only MW-45-095A is currently being sampled. Specifically, MW-45-095B is a smaller diameter well in which a ZIST sampling system was tested. MW-45-095B is considered inactive. These details will be included in Table 2.1-2, with only 095A included in Table 2.1-3.	Concur. MW-23: Do not concur. See DTSC response to cited comment. Need to develop well quality criteria and well maintenance flow chart. MW-45-095 Cluster: Concur.				

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					It is correct that MW-53S is not operational. A note to this effect will be added to the table. The comment regarding maintaining the current well designations for MW-58BR and MW-64BR has been noted. Currently, as approved in the first quarter of 2013, packers have been removed and single zone micro-purge sampling is being performed at 165 ft in MW-58BR and at 255 ft in MW-64BR. Due to the timing of the 60% Design Submittal, inside- versus outside-plume monitoring wells were assigned based on fourth quarter 2011 monitoring results. All inside/outside-plume assignments (including MW-70-105) will be reassessed based on the latest available data for the 90% Design Submittal.	MW-53S: Okay. MW-58BR and MW-64BR: Noted. Comment resolved pending review of the 90% design.				
673	DTSC-213	Appendix L O&M Plan Volume 2, Table 2.1-3	Currently-Anticipated Timeframe for Cr(VI) Concentration Changes	Clarify and define the referenced column heading in the table and some locations in the text where this table is referenced. The heading is not clear if it is referring to the arrival time of treated water at which point a change in concentration is anticipated or actual time to cleanup Cr(6) to less than 32 ppb. Some flood plain wells that one would expect to have a shorter cleanup duration are listed with a significant timeframe under this column (e.g. MW-34-100 has 20-30 years listed, MW-36-100 lists 2-10 years) These duration does not appear to correspond to model simulation for Cr(6) reduction.	The column headings in Table 2.1-3 and Table 2.2-1 will be changed for consistency to read "Currently-Anticipated Timeframe for Cr(VI) Concentration Decreases," and additional detail will be added to the text in Sections 2.1 and 2.2 where the tables are referenced. The timeframe ranges for Cr(VI) attenuation will also be re-assessed based on model results, and tighter timeframes provided in the 90% Design Submittal.	What are the anticipated changes between 60% and 90% that would cause PG&E to reconsider timeframe in 90%? Please clarify what defines a “decrease” (one ppb, 100 ppb, an order of magnitude, or ????). Clarify that this decrease is not necessarily the cleanup goal. For clarity, what’s the point of the column? Comment resolved pending review of 90% design.			Comment resolved.	O&M Manual Volume 2 Sections 2.1, and 2.2.1 O&M Manual Volume 2 Table 2.2-1
674	FMIT-179 Hualapai-130 Chemehuevi-130 Cocopah-130 CRIT-130	Append L2- V2 2.1 & 4.2 Table 2.1-3 &Table 4.2.1		Table 2.1-3 has the symbol “T” for wells that may be monitored continuously with a transducer, however, none of the compliance/monitor wells appear to have transducers planned. Some or all of the IRZ wells may have transducers installed (e.g. bot p. 3-7). Is there any plan to collect water level data from any of the compliance wellsmore frequently than quarterly? Might there be value in collecting	As the commenter notes, the monitoring wells selected for transducer locations are listed in Table 4.2-1 and Section 4.2.7. The groups of wells listed for transducers in Table 4.2-1 are locations where significant changes in water levels are anticipated. The wells in these groups overlap substantially with the wells, both inside and outside of the plume, that have been specified in the compliance monitoring program,			Comment resolved pending review of the 90% design.	Comment resolved.	O&M Manual Volume 2 Table 2.1-2

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				water level data more frequently (monthly? bi-weekly?) from a subset of monitor wells during remedy startup and duringthe first remedial cycle? Such data may aid in refining the GW model in evaluating lithologic heterogeneities and response of the system. Section 4.2.7 does indicate wells Q, P, S andothers may have transducers. And Table 4.2.1 indicates that some wells in various categories may have transducers.	resulting in a comprehensive set of continuous water level data. To help clarify this point, a column will be added to Table 2.1-2 in the 90% Design Submittal indicating which monitoring wells will be outfitted with transducers.					
675	FMIT-173 Hualapai-125 Chemehuevi-125 Cocopah-125 CRIT-125	Append L2- V2 2.1 Figure 2.1-1	Figure of compliance monitoring well network.	This figure does not show IRZ18, which appears to have been added during the modeling exercise due to potential breakthrough. (e.g. Append B, Fig. 6.4-2) With the addition of IRZ-18, does this impact the location of planned compliance well "D"?	The inclusion of IRZ-18 in Appendix B, Figure 6.4-2 was an error. IRZ-18 is still a future provisional well location and was not included in the modeling runs. The figure will be corrected in Appendix B for the 90% Design Submittal. See also response to comment #345a FMIT-61. The locations of IRZ-17 and IRZ-19 depicted in Figure 2.1-1 represent the most current planned locations. Based on these positions, the location of compliance well "D" is appropriate. If IRZ-17 and IRZ-19 are shifted based on future discussions, the location of compliance well "D" will also be reconsidered. Note that several of the IRZ Injection Well locations (including IRZ-17 and IRZ-19) may change based on ongoing discussions between PG&E and stakeholders. The 90% Design Submittal (including Appendix B and Appendix L) will be updated to reflect the finalized NTH IRZ well locations.			Comment resolved.	Comment resolved.	O&M Manual Volume 2 Figure 2.1-1
676	FMIT-178	Figure 2.1-3		Do the wells have to go inside the area between the extant lobes of the Maze? This area is extremely culturally-sensitive and the lack of discovered artifacts in this area does not mean that it is not culturally significant and is related to, and a part of the adjacent areas. Every effort should be made to avoid and minimize infrastructure in this area.	It is assumed that this comment refers to monitoring well "I", in particular, and was perhaps written prior to resolution of the location for this proposed monitoring well in July. See also response to comment #707a FMIT-182. A site walk was held on July 30, 2013 to see the options for relocation of monitoring well "I". During the site walk, the group visited the area of the westernmost alternative location. After walking the area and considering the alternatives, the group decided that: (1) a location approximately 45 to 50 feet south-southeast of the original location proposed during the July			Comment resolved pending review of the 90% design and relocation of well "I" based on site walk with the Tribes.	Comment resolved.	O&M Manual Volume 2 Figure 2.1-3

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					2013 TWG meeting was acceptable to stakeholders; and (2) while this location was more physically constrained than the original location, it likely provided sufficient room for construction. The easternmost alternative location was also discussed, but the group agreed that the westernmost alternative location was preferred from both a technical and stakeholder perspective. PG&E documented the discussions and satisfactory resolution of concerns in a letter to the FMIT and the Hualapai on August 30, 2013.					
677	DOI-261	Section 2.2, Figure 2.2-2	Decision Diamond 3	It seems the questions posed should have the same answer in order to move forward with the decision, i.e., indicate “AND” and not “OR”.	In this case "OR" is the appropriate decision point. If TOC or dissolved iron is present, then the conditions for chromium reduction are being provided and operations should continue. It is possible that Cr and iron would be present and Cr(VI) would be greater than 32 ppb because complete reduction has not yet occurred. If that is the case, then operations would still continue in the same manner.		Comment resolved.		Comment resolved.	Not applicable
678	DOI-262	Section 2.2, Figure 2.2-2	Decision Diamonds 16 and 18	Inclusion of both diamonds seems unnecessary. Also, it is not clear how the decision logic flows to these two decision diamonds. The decision diamonds could be deleted and Note 2 expanded to discuss using the Contingency Plan when short and long term modifications are ineffective. The Contingency Plan (Table 2.1-1) does not appear to provide more information than what is given in this diagram.	**Flowchart** Boxes 16 and 18 deal with two different issues: incomplete chromium treatment versus unanticipated migration of byproducts. The actions that would be taken to address these two issues are different, and so they were included as two separate branches of the diagram. The flowchart includes actions that are currently foreseen to potentially be needed to adapt the operations for various issues. Note 2 indicates that actions beyond those that are currently contained in the flowchart may be considered and implemented. Consequently, it is difficult to expand upon the list at this stage (i.e., in advance of knowing what conditions will occur that will not be covered by the current list of actions). **Contingency Plan** The Contingency Plan—referred to in Box 19 of the flowchart—provides two potential measures that may		Comment resolved.		Comment resolved.	O&M Manual Volume 2 Figure 2.2-2

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					need to be taken if Cr(VI) treatment at the NTH IRZ is not complete: (1) the construction of additional injection/extraction wells beyond the currently specified provisional wells; or (2) use of additional water sources, if the system is flow limited. These measures are stated under actions if the NTH IRZ "is not effective at removing Cr(VI) from groundwater as designed" in Table 2.1.1 (Appendix L, Volume 3). A note will be added to clarify this point at the branches to Box 18: "If operational adjustments prove to be ineffective at achieving system performance, then the adaptive operations process flows to the Contingency Plan." A note will be added to clarify this point at the branches to Box 16: "If operational adjustments prove to be ineffective at achieving system performance, then the adaptive operations process flows to the Riverbank Extraction Hydraulic Control Evaluation."					
679	DOI-263	Section 2.2, Figure 2.2-3	Box 14	The path to Box 14 is not clear from the logic diagram. The box could be eliminated and Note 1 expanded to discuss using the Contingency Plan when short and long term modifications are ineffective. Also, the Contingency Plan (Table 2.1-1) does not appear to give more information than that provided in this diagram.	If the evaluation in Decision Diamond 12 indicates that the northern NTH IRZ extraction in conjunction with the IRL extraction is still not adequately controlling Cr(VI), then additional adjustments need to be made cycling back to Box 4 on the diagram. However, if several rounds of adjustments have been made and the system is still not performing adequately, additional actions will need to be taken under the Contingency Plan. A note will be added to clarify this point at the branches to Box 14: "If operational adjustments prove to be ineffective at achieving system performance, then the adaptive operations process flows to the Contingency Plan."		Comment resolved.		Comment resolved.	O&M Manual Volume 2 Figure 2.2-3
680	DOI-264	Section 2.2, Figure 2.2-4	Box 33	The path to Box 33 is not clear from the logic diagram. The box could be eliminated and Note 1 expanded to discuss using the Contingency Plan when short and long term modifications are ineffective.	See response to comment #679 DOI-263. A similar note will be added to clarify that when rounds of adjustments listed on the flowchart do not appear to improve performance, the adaptive operations process will flow to the Contingency Plan.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Figure 2.2-4

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681	DOI-273	Section 3.0, Page 3-1	General Comment	Will the sampling results of the monitoring program be discussed in the quarterly reports to the regulators, along with conclusions and recommendations?	As specified in the reporting template provided in Exhibit L2.2-4 of the Introduction to Appendix L, quarterly reports will include a performance summary with sampling results, an interpretation of results, and an interpretation of progress toward RAOs.		Comment resolved.		Comment resolved.	Not applicable
682	DOI-274	Section 3.1, Page 3-1	"The compliance monitoring program will include 156 pre-existing monitoring intervals, 19 proposed locations, and 16 surface water sampling locations."	Should the term "intervals" be changed to "locations"?	The term "interval" rather than "location" was meant to highlight that multiple vertical intervals at individual locations are available to evaluate performance in three dimensions.		Comment resolved.		Comment resolved.	Not applicable
683	DTSC-214	Appendix L O&M Plan Volume 2, 3.1 Monitoring Locations, Anticipated Concentration Changes, and Timeframes, Page 3-1		Requested cross-sections and particle tracking should be provided to DTSC so that the proposed Compliance Monitoring Program can be properly assess. See preliminary comments on Table 2.1-3. A list of all site wells should be developed (or added to Tables 2.1-2 and/or Table 2.1-3, even those not designated to a particular program.	Cross sections will be produced to show monitoring well screens and chromium plume delineations (included in **Attachment Q**, at the end of this table). Per discussions during the TWG and subsequent calls with the agencies, simulated flow fields will be provided to illustrate the simulated groundwater flow directions (included in **Attachment E**, at the end of this table). Transport modeling has been provided and is a superior tool for assessing remedy performance and designing the monitoring program. In the 90% Design Submittal, all existing site wells will be included in Table 2.1-2, including those that are not designated to a particular program.	Okay, DTSC is awaiting the flow field diagrams for all layers and will reserve comments for now. DTSC will utilize the flow fields and cross-sections to assess the Compliance Monitoring Program.			Per DTSC request, particle track figures for Layers 1-4 were submitted to DTSC on March 11, 2014 (see **Attachment R** at the end of this table). DTSC will continue to assess the monitoring program and provide any further input. Based on the submitted data, DTSC provided initial thoughts on potential new monitoring wells to PG&E in March 2014. PG&E and Agencies will continue to discuss additional monitoring wells and with resolution occurring prior to submittal of the 90%.	O&M Manual Volume 2 Table 2.1-2
684	DTSC-215	Appendix L O&M Plan Volume 2, 3.1 Monitoring Locations, Anticipated Concentration Changes, and Timeframes, Page 3-1	The surface water sampling network includes ten river channel sampling points, four shoreline sampling points located along the Colorado River, and two surface water	Describe the difference between shoreline/ surface water samples and in-channel samples as I don't recall the difference being stated elsewhere (e.g., multi-level samples for river channel locations). Describe what vertical horizon the samples are obtained and reference the surface water sampling SOP.	The following text will be inserted into the 90% BOD: "In channel surface water samples are collected with a peristaltic pump from a boat at two depths: 1 foot from the river bottom and 1 foot from the water surface. Shoreline samples are collected with a bailer or sampling pole from 4 to 6 inches below the water surface. These details are described in the Depth-Specific Surface Water Sampling SOP (SOP-A4)."	Comment resolved.			Comment resolved.	O&M Manual Volume 2 Section 3.1

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			sampling points in the East Ravine.							
685	DTSC-216	Appendix L O&M Plan Volume 2, 3.1 Monitoring Locations, Anticipated Concentration Changes, and Timeframes, Page 3-2		Site characterization efforts in the past focused on delineating the perimeter/extent of contamination that emanated from the PG&E Topock Compressor Station. As a result, the core of the plume was not well characterized. The core of the plume (where the greatest concentrations of contaminant mass occur) is an important component of the remedy as it will need to be aggressively "attacked" as part of the cleanup effort. Failure to identify the plume cores can lead to very extended cleanup timeframes as well as remedy failure. Suggest adding wells to characterize plume core. Perhaps the TWB-3 area and northeast of IRL-6. Are locations between I-40 and the railroad inaccessible to monitoring well drill rigs?	See also responses to comment #136 DTSC-43 and #137 DTSC-44. PG&E has considered the installation of additional wells to the north of TWB-3/northeast of IRL-6. However, due to constructability issues observed in the field (e.g., presence of multiple major gas pipelines and evidence of significant erosion) as well as access/right-of-way limitations associated, for example, with construction in the area between I-40 and the BNSF Railroad, these locations were dropped from consideration. Note that future provisional wells IRL-6 and IRL-7 were proposed as a contingency should monitoring indicate that cleanup is not progressing at the anticipated rate. These wells, located in the current central portion of the Cr(VI) plume, are designated as "late time" remedial wells that are intended to accelerate the remediation process once eastward migration of the Cr(VI) plume has occurred.	Okay. Comment resolved. See response to #136 DTSC-43 and #137 DTSC-44 to confirm well location constraint issues raised and related items.			Comment Resolved.	Not applicable
686	DTSC-217	Appendix L O&M Plan Volume 2, 3.2 Sampling Analytes and Frequencies, Page 3-2	Water level measurements will be collected at all locations on a quarterly basis for comparison against groundwater flow model predictions. The frequency of water level collection will be re-assessed after the first two years of operation. These results will be used to measure hydraulic gradients and directions as lines of	More detailed discussion of water level measurements and groundwater flow determinations must be presented in the design document due to the flat gradients and ever changing river stage. How many water level monitoring wells will be fitted with pressure transducers? Where are the critical locations for water level measurements based on anticipated modeled flows?	Comment noted. See response to comment #674 FMIT-179 and Hualapai/Chemehuevi/Cocopah/CRIT -130. The network of monitoring wells selected for transducer locations was described in the text in Section 4.2.7 and Table 4.2-1. To further clarify this network, a column designating transducer locations will be added to Table 2.1-2 in the 90% Design Submittal. A discussion of these continuous water level measurements will be added to the text in Section 3.2. See also response to comment 655 DTSC-201.	The response appears adequate pending review of the revised section 3.2. Also, see response to comment #655 DTSC-201.			See response to comment #655 DTSC-201	O&M Manual Volume 2 Section 3.2

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			evidence in the assessment of hydraulic plume control, as discussed in Section 4.4.							
687	DOI-275	Section 4.0, Page 4-1	General Comment	It is anticipated that up to two years may be required in order to make the necessary adjustments to extraction and injection wells and chemical dosage in order to achieve routine operations. During this start-up period, will performance monitoring be more frequent than what is shown in Table 4.2-1?	It may take two years to bring the components of the remediation system on-line, sequentially, as outlined in the proposed transition plan in Section 7.3.2 of the main body of the 60% BOD. The monitoring frequencies specified in Table 4.2-1 are for each component of the system and would be implemented as each component is brought on-line, as detailed in Note 5 of the table. This plan does provide for increased sampling frequencies during start-up of individual components. For example, the sampling frequency for the NTH IRZ dose response wells is high (i.e., monthly) during the first year of implementation, which is anticipated to include 6 months ON and 6 months OFF as specified in the table. Higher sampling frequencies are also anticipated for the extraction wells during the first few months of operation, as specified in the table.		Comment resolved.		Comment resolved.	Not applicable
688	DOI-276	Section 4.0, Table 4.2-1		Note 2 is not identified in the table.	Note 2 will be removed from the table and references to notes will be corrected in the 90% Design Submittal or added to the table.		Comment resolved.		Comment resolved.	O&M Manual Volume 2 Table 4.2-1
689	DOI-277	Section 4.1, Page 4-1	"These estimates will be updated as the 90 percent design is completed, as the system is installed, and as baseline sampling is conducted. The estimates will also be adjusted during remedy implementation as data are collected during operations and	Will the estimates be updated by re-running the computer model?	Yes, the estimates will be updated as the solute transport model is refined (see response to comment #653 DOI-268 for more detail).		Comment resolved.		Comment resolved.	O&M Manual Volume 2 Section 4.1

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			the solute transport model is refined."							
690	DOI-278	Section 4.1, Pages 4-1 and 4-2	TOC, Arsenic, Iron and Manganese sections	Will isopleth maps be developed in order to assess individual chemical concentration distributions, and also to compare concentration trends to earlier model runs?	Concentration maps for byproducts (iron, arsenic, and manganese) will periodically be prepared to compare concentration distribution with baseline data and model predictions. Color dot maps or concentration shading will be used to illustrate the distribution, rather than isopleths. Isopleths would be difficult to construct given the elevated concentrations of these constituents in the reducing rind. Concentration maps are less useful for TOC and are not planned; the distribution is expected to be limited to the dose response wells. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Section 4.1
691	FMIT-181 Hualapai-132 Chemehuevi-132 Cocopah-132 CRIT-132	Append L-Vol 2 Section 4.1 p. 4-2	*Although arsenic concentrations are expected to increase due to IRZ operations, arsenic is expected to attenuate rapidly outside of the IRZ footprint. In NTH IRZ dose response wells, concentrations are expected to be between 2 and 10 µg/L, with a maximum of 15 µg/L.*	Are these expected arsenic concentrations based on known arsenic concentrations in HNWR-1?	The expected arsenic concentrations provided in this section for the in situ areas were based on organic carbon concentrations rather than known concentrations in HNWR-1. The 60% design assumed that water from HNWR-1 would be treated for arsenic; these assumptions will be updated in the 90% design if that changes.			Comment resolved pending review of 90% design documents.	Comment resolved.	O&M Manual Volume 2 Section 4.1
692	DTSC-218	Appendix L O&M Plan Volume 2, 4.2 Sampling Locations, Analytes and Frequencies, Page 4-3		Requested cross-sections and particle tracking should be provided to DTSC so that the proposed Process Control Monitoring Program can be properly assessed.	Cross-sections will be produced to show monitoring well screens and chromium plume delineations (included in **Attachment Q**, at the end of this table). Per discussions during the TWG and subsequent calls with the agencies, simulated flow fields will be provided to illustrate the simulated groundwater flow directions (included in **Attachment E**, at the end of this table). Transport	Okay, DTSC is still evaluating the flow field diagrams and will reserve comments for now. DTSC will utilize the flow fields and cross-sections to assess the Process Control Monitoring Program.			Per DTSC request, particle track figures for Layers 1-4 were submitted to DTSC on March 11, 2014 (see **Attachment R** at the end of this table). DTSC will continue to assess the monitoring program and provide any further input. See response to RTC #683	90% BOD Appendix B, Figures 6.5-13 through 6.5-20 90% BOD Section 3.1, Figures 3.1-1 through 3.1-7

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					modeling was provided and is a superior tool for assessing remedy performance and designing the monitoring program.				DTSC-214.	
693	DTSC-219	Appendix L O&M Plan Volume 2, 4.2 Sampling Locations, Analytes and Frequencies, Page 4-3	Regardless of sampling frequency specified in the Process Control Monitoring Program, baseline data will be collected from all monitoring wells in the program for the full suite of analytes listed in Table 4.2-1 where these data do not already exist.	Also indicate that the full suite will be collected if it has been a while since the last sampling round (e.g., 2 to 3 years).	The text in the 90% Design Submittal will be modified to read "…where these data do not already exist or have not been collected within the past two years."	Okay			Comment resolved.	O&M Manual Volume 2 Section 4.2
694	DOI-279	Section 4.2.1, Page 4-4	"Nitrate. Nitrate is a primary indicator of the establishment of reducing conditions . . . "	The presence of nitrate is an indicator of oxidizing conditions, not reducing conditions. Please clarify.	It is not the "presence" of nitrate that is an indicator of reducing conditions, but rather a decrease in nitrate concentrations. The bullet will be revised in the 90% Design Submittal to read: "The removal of nitrate from solution is a primary indicator of the establishment of reducing conditions..."		Comment resolved		Comment resolved.	O&M Manual Volume 2 Section 4.2.1
695	DOI-280	Section 4.2.1, Page 4-4	"General water quality parameters. . . . These parameters may be will be used to answer specific questions that arise, . . . "	Please clarify which terms are correct – "may be" or "will be"?	The text will be changed to "may be" throughout. General water quality parameters may be useful for troubleshooting as described in the section and may be analyzed on an as needed basis; however, sampling for general water quality parameters is not being specified definitively in the monitoring plan.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Section 4.2.1
696	FMIT-184 Hualapai-134 Chemehuevi-134 Cocopah-134 CRIT-134	Append L2- V2 Sect 4.2.3 p. 4-5	*Monitoring wells on the Arizona side of the river (MW-54 and MW-55clusters) will be included in the river bank extraction monitoring well network. These will serve as*	Well cluster MW-55 is located some distance up in the Topock marsh, not really on opposite the river bank. Would it be suitable to include well cluster MW-58, although south of the MW-55 cluster, this location is on the river bank, between the south end of the IRZ and the East Ravine loop?	PG&E believes that the commenter is suggesting including well cluster MW-56 rather than MW-58. Well cluster MW-56 is in fact already included in the riverbank extraction monitoring well network and will be included in this sentence in the 90% design, as indicated in Table 2.1-2. MW-56 does serve as a sentinel well cluster, and the point will be clarified in the text in the 90% BOD. MW-58 is located south of National Trails			Comment resolved pending review of 90% design documents.	Comment resolved.	O&M Manual Volume 2 Section 4.2.3

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			sentinel wells…		Highway near East Ravine extraction well ER-6 and has been included in the monitoring program as part of the East Ravine Extraction monitoring well network.					
697	FMIT-185 Hualapai-135 Chemehuevi-135 Cocopah-135 CRIT-135	Append L2- V2 Sect 4.2.5 p. 4-5 & Table 2.1.3		Regarding extraction wells, Table 2.1.3 indicated water levels in these will also be taken only quarterly. It may be useful to collect water levels from at least a subset of extraction wells on a monthly basis, at least for the initial cycle, to aid in confirming that plume control is maintained consistently.	Extraction wells will be equipped with pressure transducers to allow for continuous water level monitoring. A column will be added to Table 2.1.3 to indicate which wells have pressure transducers.			Comment resolved pending review of 90% design.	Comment resolved.	O&M Manual Volume 2 Table 2.1-3
698	DTSC-220	Appendix L O&M Plan Volume 2, 4.2.7 Water Level Monitoring, Page 4-7	The water level measurements will be converted to elevations referenced to sea level so that the water levels can be integrated site-wide for interpretation of potentiometric levels and hydraulic gradients.	Discuss salinity and temperature corrections that will need to be made to water level measurements. Discuss when it will be mandatory to utilize pressure transducers.	These issues will be discussed in the 90% Design Submittal. Salinity and temperature corrections will be discussed in SOPs included in the 90% design. Text will be added to discuss the reasoning behind pressure transducer deployment. A column to specify transducer locations will be added to Table 2.1-2.	Comment resolved pending review of 90% design.			Comment resolved.	O&M Manual Volume 2 Section 4.3 O&M Manual Volume 2 Table 2.1-2
699	DOI-281	Section 4.3.1, Page 4-6	"The approach and methodology for this assessment will be consistent with regulatory guidance prepared and distributed by the U.S. Environmental Protection Agency (USEPA), including the document *A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems*, dated January	Please refer to the Attachment D regarding Capture zone Analysis per USEPA 2008 Report.	**SPECIFIC COMMENT (DOI ATTACHMENT D TO DOI-281):** *Step 2 – Does the current recovery and treatment system adequately capture and treat deeper contamination in the deeper bedrock area?* The proposed East Ravine Extraction Wells will be within the fractured/faulted bedrock; therefore, sufficient well depth will be important to (1) address depth of potential Cr[VI] in groundwater, and (2) allow for enough available drawdown. It is anticipated that the extraction wells will be drilled to an elevation that is at least as deep as the deepest monitoring well used for monitoring Cr(VI) in groundwater in the East Ravine area. **SPECIFIC COMMENT (DOI ATTACHMENT D TO DOI-281):** *Step 2 – If IRZ-40 were to be incorporated*		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Sections 2.2.3, 4.2.9, 4.3.3, and 4.3.4

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			2008 (USEPA 2008).		*into the design as an active extraction well, what impact would this have on the capture zone? Has this been modeled?* IRZ-40 has not been simulated as an active extraction well. While it may produce a small simulated capture zone, due to the relatively thin saturated aquifer thickness in this area, only a limited sustainable rate would be achieved at this location. IRZ-40 would provide more benefit as a provisional carbon amended injection well in order to address potential Cr(VI) impacts in the aquifer. Also see response to comment #109 DTSC-30 with respect to additional extraction wells in the East Ravine area. **SPECIFIC COMMENT (DOI ATTACHMENT D TO DOI-281):** *Step 3 – Defining the capture zone within the field does include utilizing observed drawdown values within monitoring wells in response to pumping. How will PG&E factor in fluctuations of groundwater elevation in response to changes in river elevation to document drawdown within each monitoring well?* Monitoring studies at the site have shown that water levels in monitoring wells located near the river fluctuate in a sinusoidal pattern with a frequency of approximately one day. Wells closest to the river exhibit a daily fluctuation magnitude of between 1 and 2 feet per day (compared to a daily river stage fluctuation of up to 3 feet). However, this oscillation does not prohibit assessment of longer-term trends. To do this, a smoothed curve—representing a median water level elevation for any given day—will be created, and will serve as the source for the drawdown values used in assessment of groundwater gradients. The use of transducers in monitoring wells will allow for this method to be used. **SPECIFIC COMMENT (DOI ATTACHMENT D TO DOI-281):** *Step 3 – Please explain how PG&E will develop groundwater contours; hand*					

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					contouring or computer based contouring? If computer based, what software is anticipated to be used? When using water level data at extraction wells, will well inefficiency and well losses be taken into consideration in order to more accurately state water levels at extraction points? Does PG&E have piezometers located adjacent to each extraction well location? Hand contouring will be performed to generate water level contours for mapping. For water level values at extraction points, well efficiency effects will be considered. First, step tests will be performed at some extraction wells. Such test data will then be used to estimate well efficiency and, thus, a corrected water level will be calculated. Second, in lieu of having piezometers immediately adjacent to extraction wells (in order to address the borehole count restrictions), piezometers will be installed within the filter pack (outside of the extraction well casing) in some wells, and the difference between the water levels in the piezometer and in the extraction well casing during pumping will also aid in proper correction for well efficiency effects. **SPECIFIC COMMENT (DOI ATTACHMENT D TO DOI-281):** *Step 6 – How does PG&E plan on performing Step Six (Interpret actual capture based on Steps 1-5, compare to target capture zone, assess uncertainties and data gaps)? What data, analysis, modeling, and graphic presentations does PG&E plan on using to interpret actual capture and comparing these results to the targeted capture zones?* PG&E intends to present an assessment of plume control by using the available lines of evidence as discussed in Section 4.3 of the Sampling and Monitoring Plan (Appendix L, Volume 2). These lines of evidence are consistent with the USEPA (2008) guidance. This assessment will be presented in a way consistent with the recommended approach as outlined					

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					in the USEPA (2008) guidance document, pp. 26-29. Cr(VI) plume control will be assessed by: interpreting, to the extent possible, the extent and magnitude of hydraulic impact; assessing uncertainties and potential data gaps; and, evaluating the need to reduce or increase extraction rates.					
700	DTSC-221	Appendix L O&M Plan Volume 2, 4.3.2 Definition of the Target Capture Zone in Conjunction CSM and RAOs, Page 4-7	Based on this RAO, the objective of hydraulic capture of Cr(VI) in groundwater at the site is to protect the designated beneficial uses of the Colorado River.	The capture zone discussion appears to be applied to protection of surface water. It would appear necessary to include capture zone assessment to protect groundwater resources (e.g., prevent migration of chromium or byproducts to the east of the river bank line). The text should be expanded to discuss this issue.	The design of the river bank extraction system applies to both the river and groundwater beyond the river bank line. The extent to which plume control is required at various portions of the site can be defined by the RAOs and the DQOs for the selected groundwater remedy (RAOs are found in Section ES.2, 60% BOD Report, p. vii.; DQOs are found in Section 2, Draft O&M Plan, Volume 2, pp. 2-1 through 2-9.). The two RAOs relative to plume control are as follows. • RAO 2: Prevent or minimize migration of Cr(T) and Cr(VI) in groundwater to ensure concentrations in surface water do not exceed water quality standards that support the designated beneficial uses of the Colorado River (11 ug/L Cr[VI]). • RAO 4: Ensure that the geographic location of the target remediation area does not permanently expand following completion of the remedial action. RAO 4 will be added to section 4.3.2. The six DQOs relative to plume control are as follows. • NTH IRZ DQO-3: By-product generation and migration from the NTH IRZ must be controlled. • NTH IRZ DQO-4: Extraction on the north end of the NTH IRZ will be conducted to control Cr(VI) with the NTH and river bank extraction systems. • IRL DQO-3: Control migration of Cr(VI). • IRL DQO-4: Control the migration of by-products in the deeper units.	The section needs to be revised to clarify that capture zones will also be applied to protection of the groundwater basin as a resource.			PG&E will work on items related to this comment as directed in the Agencies' direction letter dated April 4, 2014.	O&M Manual Volume 2 Section 4.3.2

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					• TCS DQO-2: TCS Recirculation Loop Transwestern Bench Extraction Wells will be operated to remove Cr(VI) mass from the high concentration area in the vicinity of the TCS and control migration toward the East Ravine. • TCS DQO-3: East Ravine Extraction Wells will be operated to remediate Cr(VI) and control migration towards the river.					
701	FMIT-186 Hualapai-136 Chemehuevi-136 Cocopah-136 CRIT-136	Append L2- V2 4.3.3 p. 4.7 & Sect 4.3.3.4 p.4-9	*There are a number of methods or tools available to access plume control. Each of these methods is considered a separate line of evidence.*	Tracer testing is listed under 4.3.3 as one of the methods to assess plume control. However, on page 4-9, the text indicates that of all the “lines of evidence” listed, tracer testing was eliminated. It is confusing to list this as a “line of evidence” and then eliminate it later in the text. It would be clearer to just leave this element off the initial list, and include a discussion of this and any other methods that were considered and discarded as a separate paragraph(s).	The discussion that is referenced was designed to provide a comprehensive list of available methods and tools generally known to the profession as well as mentioned in the USEPA guidance. This will be clarified in the 90% design to satisfy the comment.			Comment resolved pending review of the 90% design.	Comment resolved.	O&M Manual Volume 2 Section 4.3.3
702	MWD-18	Appendix L, Draft O&M Manual, Section 4.3	Hydraulic Control Evaluation/ Capture zone analysis	For the 90% design report, this section should include a specific approach that will be used to confirm capture zone effectiveness over time. Due to the various stresses that will be placed on the aquifer over time due to the turning on and off of injection and extraction wells and natural stresses (such as changes in river stage, flooding of Bat Cave Wash, or seismic activity), various metrics should be established for these different time periods that meet plume treatment criteria and are shown to be protective of the Colorado River.	Sample collection will be coordinated with the transient water level data collected using the transducers, and sample timing may be adjusted to better reflect water quality variability as a function of seasonal variations in river stage and corresponding groundwater level changes.				Comment resolved.	O&M Manual Volume 2 Section 4.3.3
703	MWD-19	Appendix L, Draft O&M Manual, Section 4.3.3.1	Capture zone analysis	The use of river stage measurements compared to groundwater levels will be misleading because as the river stage declines in the winter months, there is a lag in the groundwater response, and the result would indicate flow towards the river. For the IM, a gradient between paired wells was used to assess capture. A similar metric should be developed for the planned remedy for times of high and low river stages.	See response to comment #699 DOI-281 for gradient assessments related to river stages and corresponding fluctuations of groundwater levels. See response to comment #655 DTSC-201 with regard to hydraulic gradient assessments.				Comment resolved.	O&M Manual Volume 2 Section 4.3.3

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704	DOI-282	Section 4.3.2, Page 4-7	"The current extent of Cr(VI) concentrations in groundwater that exceed 32 ug/L, the regional background concentration, is illustrated in Figure 2.1-1."	Do the combined outlines of both isopleths of Cr (VI) concentrations above 32 ug/L represent the horizontal capture zone that PG&E is targeting?	No. The proposed remedial design is not intended to provide complete hydraulic control of the Cr(VI) footprint defined as >32 ug/L. The remedy design is a combination of in situ groundwater treatment and hydraulic control, and is intended to remediate the Cr(VI) plume through implementation of IRZs as well as the hydraulic control in specific areas. While some portions of the Cr(VI) >32 ug/L will be captured by extraction wells, the remedy is designed to treat remaining Cr(VI) >32 ug/L that may not be hydraulically controlled. Thus, the Target Capture Zone (the term from USEPA, 2008) is not all Cr(VI) >32 ug/L but rather portions of the plume that are not reduced by the IRZ, including: (1) where Cr[VI] is >32 ug/L within the flood plain and to the east of the planned IRZ wells; (2) where Cr[VI] >32 ug/L is within the bedrock in the East Ravine area; and (3) where byproducts are at concentrations above natural levels within the deeper portion of the unconsolidated alluvium beneath the flood plain.		Resolved.		Comment resolved.	O&M Manual Volume 2 Section 4.3.2
705	DOI-283	Section 4.3.3.1, Water Level Pairs/Three-Point Gradient Analysis, Page 4-8	"This line of evidence (water level pairs/three-point gradient analysis) will be used to the extent allowed by the locations of the monitoring wells."	In the event that additional wells are required to more accurately reflect the gradient analysis, does PG&E plan on installing the additional wells?	The currently proposed monitoring network was designed to strike a balance between adequately describing the hydraulic gradients needed to assess hydraulic control objectives while minimizing infrastructure and honoring the well counts in the FEIR. If data gaps become apparent during initial data collection and evaluation, PG&E would use monitoring wells remaining within the well count to fill the data gap.		Resolved.		Comment resolved.	Not applicable
706	DOI-284	Sections 4.3.3.1 and 4.3.3.4, Pages 4-8 and 4-9		Is "USEPA (2008)" a citation? If so, it should be "(USEPA 2008)". A review of formatting would ensure continuity of referencing throughout the document.	The in-text citation will be changed to "(USEPA 2008)".					O&M Manual Volume 2 Section 4.3.3
707a	FMIT-182	Append L–Vol 2 Figure 4-2.1 "Proposed Monitoring Well I Location"	Note on Figure: *Area considered for monitoring Well location I. The proposed location shown*	Proposed monitoring well location "I" needs to be reevaluated in context of the new project EIR boundaries under recent consideration. It is not clear that a well in this location will not have cultural, visual and spiritual impacts and should only be placed	Comment noted. PG&E appreciates the FMIT and the Hualapai for working with the TWG to resolve the relocation of proposed monitoring well "I". A site walk was held on July 30, 2013			Comment resolved.	Comment resolved.	O&M Manual Volume 2 Figure 2.1-3

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			for monitoring wells within this area was selected based on topographic/access and field verification that the proposed location does not create any direct physical impact or effect on the Topock maze, as it is manifested archaeologically, in compliance with EIR mitigation measure cul-1a-20, PA and CHPMP mitigation measures.	after the latest round of archeological surveys and geoarchaeological studies have been fully incorporated into a updated EIR boundary. The placement of these wells should be discussed with the Tribes in light of the latest such surveys.	to see these options for monitoring well relocation. During the site walk, the group visited the area of the westernmost alternative location. After walking the area and considering the alternatives, the group decided that: (1) a location approximately 45 to 50 feet south-southeast of the original location proposed during the July 2013 TWG meeting was acceptable to stakeholders; and (2) while this location was more physically constrained than the original location, it likely provided sufficient room for construction. The easternmost alternative location was also discussed, but the group agreed that the westernmost alternative location was preferred from both a technical and stakeholder perspective. PG&E documented the discussions and satisfactory resolution of concerns in a letter to the FMIT and the Hualapai on August 30, 2013.					
707b	Hualapai-133 Chemehuevi-133 Cocopah-133 CRIT-133	Append L–Vol 2 Figure 4-2.1 “Proposed Monitoring Well I Location”	Note on Figure: *Area considered for monitoring Well location I. The proposed location shown for monitoring wells within this area was selected based on topographic/ access and field verification that the proposed location does not create any direct physical impact or effect on the Topock maze, as it is manifested archaeologically, in compliance with EIR mitigation measure cul-*	Proposed monitoring well location “I” needs to be reevaluated in context of the new project EIR boundaries established in the summer of 2013. It is not clear that a well in this location will not have cultural, visual and spiritual impact and should only be placed after the latest round of archeological surveys have been incorporated into a updated EIR boundary. The placement of this well should be discussed with all stakeholders in light of the latest archeological surveys.	See response to comment #703a FMIT-182.			Comment resolved.	Comment resolved.	O&M Manual Volume 2 Figure 2.1-3

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			1a-20, PA and CHPMP mitigation measures.							
708	FMIT-183	Figure 4.2-1		The Tribe objects to the conclusion in the legend that the proposed location does not create any direct physical impact or effect on the Topock Maze as it is manifested archaeologically. First, the Tribe questions the accuracy of the statement. Is this conclusion supported by recent filed studies and reports, including the draft geoarchaeological report? Second, the statement can mislead a reader into thinking that the well a) has no direct impact on a tribal cultural resource (it does) and b) has no indirect and cumulative effects on cultural resources (it does). Such legends need to be corrected throughout the BOD. Have the drafters of these documents been included in the required sensitivity training?	See response to comment #84a FMIT-22. Further, the drafters of the document are sensitive to the Tribe's viewpoint. The wording in the legend is intended to refer to similar language in the EIR.				PG&E's response was discussed with the FMIT, and revised in response to that discussion.	Not applicable
709	DTSC-222	Appendix L O&M Plan Volume 2, 5.0 Other Sampling and Monitoring, Page 5-1		A program to sample domestic/private water wells in the area should be added to this section. The objective of the program should be to evaluate potential effects the remedy could impart to private wells both chemically and hydraulically. Baseline values should be established for each well prior to system startup and then sampled periodically throughout the remedy. Wells such as the new Marina well, Sanders, Smith (abandoned?), Topock2/3, and the Park Moabi wells should be included at a minimum and possibly wells associated with the EPNG station and private Arizona wells to the north.	It is PG&E's understanding that EIR mitigation measure WATER-1 is intended to proactively identify and mitigate potentially significant effects on local groundwater levels associated with freshwater extraction wells. PG&E plans to demonstrate compliance with WATER-1 using computer simulations – information from the forthcoming pumping test at HNWR-1 (as part of FWIP) which includes measurement of water levels at nearby wells, will be used in this demonstration. It is unclear how the program suggested in this comment is different from WATER-1 from the perspective of *"evaluate potential effects the remedy could impart to private wells ….. hydraulically."* At this time, PG&E is aware of one private well (Sanders) located within the area where gradients may be significantly altered by pumping from HNWR-1 on the Arizona side of the Colorado River that may supply drinking water. A recent windshield reconnaissance in Sept 2013 showed the Smith well with both piping and power disconnected. PG&E will try to	The program requested should evaluate potential effects the remedy might impart to private wells both chemically and hydraulically. Hydraulic assessment could include monitoring water levels of the monitored wells over time to see if remedy related effects are noted. Additionally, the hydraulic pumping for monitored wells should tie into the model to most accurately depict flow fields. Infrequent monitoring will suffice (e.g., baseline and then every two or three years with options to modify frequency based on better understanding of actual flow dynamics and chemical transport after the remedy progresses.) Wells located in the vicinity of the remedy should be included (e.g., Topock Marina, Sanders, Smith) to ensure the viability of the wells are not jeopardized by the remedy. Topock 2/3 data collected for			Comment resolved. PG&E will implement the monitoring program as directed assuming well owners will allow sampling of their wells. Details will be included in the 90%.	90% BOD Section 3.3.2 O&M Manual Volume 2 Sections 5.2.2 and 5.4

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					make contact with the residents to determine if the Sanders well is still used for drinking water. Topock-2/3 are public supply wells that are monitored regularly under the Safe Drinking Water Act. It is unclear why the installation of another pumping well nearby should trigger additional monitoring beyond that which is already mandated by their use as public supply wells. As for the other AZ wells mentioned in the comment, based on information in the ADEQ Topock Groundwater Study, the wells at the Mohave Topock Compressor Station (MTS-1 and MTS-2) supply water that is not suitable for drinking and is used in cooling towers and restrooms. These wells are approximately 5,000 feet from the HNWR-1 and Site B locations. The direction of the gradient at MTS is not projected to change significantly due to HNWR-1 or Site B pumping. The nearest well to the north is GSRV (also known as RPGS), which is currently not in use. Gradients will remain southerly in this area with HNWR-1 or Site B pumping. Based on communications with the Topock Marina owner, PG&E understands that the new Marina well produces salty water (specific conductance 15,000 to 18,000) that is not suitable for drinking or irrigation, and therefore, will be used only for fire protection. It is not clear whether the existing 4" well at the Marina will remain when the Marina completes the planned new production well. If not, ongoing sampling the new production well could be problematic from a water management standpoint -- the purge water is likely too salty to discharge to the ground or to the river and the purge volume will be large due to the expected large diameter and depth of the well (286 feet). While PG&E does not see a technical merit for an ongoing monitoring program of these wells, PG&E agree that a baseline data set could be beneficial. Therefore, PG&E will research the logistics associated with sampling these wells and report back to the	supply purposes should suffice provided it can be provided to agencies DTSC assumed PG&E would continue to monitor the Park Moabi wells and would include them in the private well program. RPGS/GSRV-2 should be monitored more for assessing potential effects to the Arizona fresh water pumping well (same for MTS-1 and MTS-2) in an effort to minimize installation of new wells.				

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					agencies. As for the California side of the Colorado River, PG&E has been collecting and reporting baseline data from the Park Moabi wells.					
710	DTSC-223	Appendix L O&M Plan Volume 2, 5.1.1 Sampling Locations, Page 5-1	This monitoring network is designed <u>to</u> track COPC concentrations in areas where they are currently elevated as well as areas where they may be transported during the remedial action.	DTSC concurs with the overriding basis for the COPC monitoring captured in the cited sentence. However, detailed review of well locations and sampling frequencies will be conducted after DTSC receives requested particle tracking information (including 5 year tick marks). It is requested that a separate COPC monitoring table be assembled that distinguishes between elevated COPC wells and downgradient wells (as well as other pertinent information such as analytes and frequency). Modifications/corrections will be requested. For example, Figure 5.1-2 illustrates that wells MW-66-165, MW-67-185, MW-67-225, and TW-1 have the highest selenium concentrations across the entire site, but none of them are included for selenium monitoring according to Table 2.1-2. Similar issue for nitrate.	PG&E has prepared a separate COPC monitoring table and revised its format with input from DTSC to provide more information about which wells have elevated concentrations of COPCs and to include wells where nitrate will be sampled for process control monitoring (see **Attachment N**, at the end of this table). This table will be included in the 90% design.	Comment resolved.			Comment resolved.	O&M Manual Volume 2 Section 5.1.1
711	DTSC-224	Appendix L O&M Plan Volume 2, 5.2 Monitoring of Freshwater Source (HNWR-1), Page 5-2	A detailed discussion of the desired water quality for injection is included in the 60% BOD Report (Section 3.3, Freshwater Supply and Storage).	As noted in comments on section 3.3, a detailed discussion of the desired water quality for injection do not currently exist. Discharge limits should be established for all analytes that will be injected into the aquifer. Please revise Section 3.3 to contain the required information. It's good to see that an analyte list was developed in Exhibit 5.2-2.	See responses to comment #145 DTSC-50 and #181 DTSC-70.	Response noted. See responses to comment #145 DTSC-50 and #181 DTSC-70.			Discussion between DTSC, DOI, RWQCB, and PG&E is ongoing to resolve this comment. This topic will be carried forward. Resolution of this comment will be included in the 90% design. PG&E will also work on items related to this comment as directed in the Agencies' direction letter dated April 4, 2014.	O&M Manual Volume 2 Section 2.2.2
712	DTSC-225	Appendix L O&M Plan Volume 2, 5.2 Monitoring of Freshwater Source (HNWR-1), Page 5-2	The naturally occurring arsenic concentration in Well HNWR-1 ranges from 15 to 16 µg/L, below the site background concentration of 24.3 µg/L.	Indicate that the arsenic background concentration cited is a regional value and that the area of injection contains arsenic at lower concentrations below MCLs. This is the very reason that a separate decision by the State Water Resources Board is needed for the proposed water injection from HNWR-1.	The sentence will be revised to read: "The naturally occurring arsenic concentration in Well HNWR-1 ranges from 15 to 16 µg/L, below the regional background concentration of 24.3 µg/L <u>but above the concentration in existing wells near the freshwater injection area.</u>"	Okay, provided requested edits are incorporated.			Comment resolved.	O&M Manual Volume 2 Section 5.2

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713	DTSC-226	Appendix L O&M Plan Volume 2, 5.2.1 Proposed Analytes and Frequencies, Page 5-2	Exhibit 5.2-2	Please add the typical rad. chem. analytes to this exhibit. PG&E had agreed to sample for these water quality parameters previously.	Gross alpha and gross beta analyses will be added to the analytical suite for the freshwater supply well(s) in Exhibit 5.2-2.	Okay.			Comment resolved.	O&M Manual Volume 2 Table 5.2-4
714	DTSC-227	Appendix L O&M Plan Volume 2, 5.2.2 Source Water Assessment, Page 5-2		Several DTSC comments exist on a nearly equivalent section contained in Section 3 of the BOD 60%. Please make modifications to this section as well based on those previous comments.	Comment noted. Modifications in equivalent sections in the BOD will be carried to this section.	Okay, pending review of carry over text.			Comment resolved.	O&M Manual Volume 2 Section 5.2.2
715	FMIT-187 Hualapai-137 Chemehuevi-137 Cocopah-137 CRIT-137	Append L-Vol 2 Section 5.1 p. 5-2	*Monitoring frequency for the inorganic suite will be quarterly for the first year of operation, switching to semiannual in subsequent years.*	The HNWR-1 well will be pumping at least 600 gpm of water and will be injected into upland areas that have low metal concentrations associated with local groundwater. It is therefore suggested that the sampling frequency of this water be greater than quarterly to ensure that contamination of this upland groundwater not occur. During start up a monthly sampling frequency is suggested and monthly sampling continued during periods of heavy water usage.	PG&E agrees that more frequent sampling of the freshwater well during the initial startup could provide more confidence in the stability of the water quality and agrees to revise the sampling frequency to monthly for the first 6 months followed by quarterly, assuming that the water quality is generally stable at that time. If the water quality appears to be changing rapidly, monthly sampling would be continued beyond the first 6 months. It is not anticipated that the freshwater flow rate would be varied on any regular basis, however if there was a future reconfiguration of the remedy that caused a significant increase in freshwater pumping rate, the need for additional sampling frequency would be evaluated based on the data available at that time. Text will be updated in the 90% BOD to reflect this response.			Comment resolved pending review of 90% design documents.	Comment resolved.	O&M Manual Volume 2 Section 5.2.1
716	DOI-285	Section 6.1, Page 6-1	"In summary, laboratory data will be imported into the project database and the data will be validated by the project chemist or designee."	What type of training and/or certifications will the data validator be required to possess?	See response to comment #805 DOI-348.		See response to comment #805 DOI-348.		Comment resolved	Not applicable

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717	DTSC-228	Appendix L O&M Plan Volume 2, 6.1 Data Validation, Page 6-1	Data validation procedures are provided in Sections 6.3 and 6.4 of the PG&E Program Quality Assurance Program Plan (QAPP) (CH2M HILL 2012b).	If not already done, the entire QAPP (not just an Addendum) should be included in the design document.	The Program QAPP will be included in Appendix B of the O&M Manual Volume 2. Note that this is the same Program QAPP that was included in Appendix H to the Soil RFI/RI Work Plan (January 2013). The Program QAPP was written to cover multiple projects for PG&E and covers both soil and water. The individual addendum covers details specific to a particular project or site.	QAPP should be media specific to the project associated with it. Did the soil RFI/RI WP QAPP include water sampling? Comment resolved.			Comment resolved	O&M Manual Volume 2, Appendix B
718	DTSC-229	Appendix L O&M Plan Volume 2, 6.1 Data Validation, Page 6-1	Exhibit 6.3-1	"Offsite lab data" is repeated twice in heading balloons. Please revise.	Text in the second heading balloon will be changed to "Onsite lab data".	Okay.			Comment resolved	O&M Manual Volume 2 Exhibit 6.3-1
719	DOI-286	Section 6.3, Field Measurement/Process Monitoring Data, Page 6-1		Provide discussion on the quality control activities that will occur for this type of data.	Field data will be collected electronically using hand held device and/or via down-hole sensors. The data will be maintained in a data base and reviewed by experienced field staff or chemist. Historic trends, water quality data, and well construction details will also be made available to the field crew so that they can identify anomalous data (compared to historical values) in a timely manner and field verify/correct the data after consulting with experienced scientist or chemist as appropriate. Field work will be in accordance with written SOPs. Periodic field audits by experienced staff will be conducted to verify that SOPs are being followed. Equipment calibration will follow manufacturers' recommendation to ensure data quality. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Section L3.1 O&M Manual Volume 2 Section 6.3
720	DOI-287	Section 6.3, Onsite Laboratory Data, Page 6-1		Please identify the analyses that will be performed at the onsite laboratory, and indicate in the text that these data will not be validated. Provide a discussion on the quality control activities that will occur.	The following text will be added to Section 6.3 (inserted verbiage shown in <u>underline</u> typeface, deleted verbiage shown in ~~strikethrough~~ typeface): "Certain testing for process control monitoring will be performed at an onsite laboratory in accordance with site-specific SOPs. <u>Onsite lab measurements could include at a</u>		Comment resolved.		Comment resolved.	O&M Manual Section L3.1 O&M Manual Volume 2 Section 6.3

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					minimum, Cr(VI), Cr(T), Fe(II), Conductivity, Turbidity, and pH (see Appendix A for SOPs). Additional measurements could be added in the future. The onsite lab data ~~collected~~ will be recorded in a bench log book and entered into a spreadsheet and/or database periodically. Although the onsite data will not be validated using the same procedure as the offsite lab data, they are and will continue to be reviewed, and anomalous results will be reviewed, and if needed, reanalyzed at the direction of the project chemist. Onsite laboratory samples will periodically be analyzed in conjunction with offsite analysis, and the data will be reviewed/compared for quality and accuracy."					
721	DOI-288	Section 6.3, Offsite Laboratory Data, Page 6-1	"At a minimum, the laboratory will maintain the following records: . . . "	How long will the laboratory maintain such records?	See response to comment #527 DOI-203.		Comment resolved		Comment resolved.	O&M Manual Volume 2 Section 6.3
722	DTSC-230	Appendix L O&M Plan Volume 2, 6.5 Reporting, Page 6-4	Exhibit 6.5-1	Make the following edit: Monitored natural attenuation (MNA) as a long-term component to address residual Cr(VI) that may remain in recalcitrant portions of the aquifer after enhanced in-situ treatment.	The suggested text edit will be made.	Okay.			Comment resolved	O&M Manual Exhibit L2.2-2 O&M Manual Volume 2 Exhibit 6.5-1
723	MWD-20	Appendix L, Draft O&M Manual, Section 6.5, Reporting		In addition to presenting a template for quarterly reporting, annual reporting and 5-year performance review templates should also be included.	Content of five-year performance reviews is included in the Corrective Measure/ Remedial Design Work Plan (Section 4.4, page 4-12).	Concur with PG&E's response.	Concur with PG&E's response.		Comment resolved.	Not applicable
724	DTSC-231	Appendix L O&M Plan Volume 2, 7.0 Sampling Methods and Procedures, Page 7-1	Sampling and field measurements will be performed in accordance with the Standard Operating Procedures presented in Appendix A.	The SOPs contained on CD only were discovered late and will be reviewed as part of the 90%. However, Table of Content for this Volume and behind the cover to Appendix A should contain a list of the SOPs submitted so that readers can quickly refer to the document even if it is only on the CD.	Comment noted. A list of the SOPs included in Appendix A (on CD) was provided in Sections 7.1 (page 7-1) and 7.2 (page 7-4). A list of the SOPs will be added to the table of contents and cover sheet of Appendix A as requested.	Okay.			Comment resolved.	O&M Manual Volume 2 Table of contents O&M Manual Volume 2 Appendix A

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725	DOI-289	Section 7.1, Page 7-1	General Comment	What training will personnel receive on the proper use and calibration of equipment?	Equipment specific and site-specific training are initially provided by senior on-site personnel (experienced field personnel) familiar with the necessary techniques for proper use and calibration of on-site equipment. Field personnel will be trained on the appropriate procedures by the experienced field personnel using SOPs and equipment manufacturer's manuals as primary references. Periodic audits and training will be conducted by the project manager and project chemist. This practice would continue for remedy monitoring. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Section 7.1
726	DOI-290	Section 7.1, Page 7-1	"Field measurements will be collected in accordance with the following SOPs (included in Appendix A)."	Recommend the following text be added to the Required Equipment sections of SOP-A7 and SOP-A8; "a set of spare batteries should be included with equipment for field measurements".	Spare batteries are included with the equipment for field measurements. SOP-A7 and SOP-A8 will be updated to state that "a set of spare batteries will be included for field equipment."		Comment resolved.		Comment resolved.	O&M Manual Volume 2 SOP A-7 and A-8
727	DOI-291	Section 7.1, Page 7-1	"Field measurements will be collected in accordance with the following SOPs (included in Appendix A)."	Recommend language be added to the Preparation section of SOP-A11; "ensure the tape measure is not crimped and that it will hang free and clear of any obstructions enabling it to fully extend to the bottom of the well".	This is assumed, and SOP-A11 will be updated with the recommended language.		Comment resolved.		Comment resolved.	O&M Manual Volume 2 SOP A-11
728	Hualapai-138 Chemehuevi-138 Cocopah-138 CRIT-138	Append L-Vol 2 Section 7.1 p. 7-2	CrVI samples should be preserved using added basic solution, raising the pH so that no CrVI reduction would occur, and standard operating procedures from the 60% design report (SOP-L1 and – A6) are cited.	Samples for analysis of CrVI by colorimetric method using Hach DR4000 (as shown in SOP-L1) should not be preserved with the basic solution (NaOH), and should be analyzed within 24 hours of collection. The diphenylcarbohydrazide method adds an acidic reagent buffer, which brings the sample down to about pH = 2. Interferences in the method include high pH; therefore, addition of the basic preservative would create interferences in the analytical method. Another method for CrVI analyses (EPA 218.6 using ion chromatography) does allow for	SOP-L1 is applicable for process samples within IM3 treatment plant – the NaOH solution is used for SC-201B or 300A samples which are water that have been treated using ferrous chloride. SOP-L12 is applicable to groundwater samples analyzed in the on-site lab. In SOP-L12, field filtered samples are used to analyze for Cr(VI) and no preservative is added. EPA method 218.6 is the method used by the commercial laboratories and Appendix B Section 4.1.3 (the Topock QAPP addendum) requires every groundwater sample to have a matrix spike analyzed to ensure			Comment resolved.	This comment and response were discussed with the Tribes and TRC at the November 5, 2013 TWG meeting. Additional written comments were also received from TRC (Win Wright) on November 18, 2013. PG&E provided written responses to the additional comments on December 9, 2013 (see **Attachment O**, at the end of this table). TRC (Win Wright) presented final information at the February 12, 2014 TWG meeting (see additional info to **Attachment O**).	Not applicable

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				sample preservation using the basic preservative; however, this method is not described in the 60% SOP's. Bench tests and matrix spikes could be done to determine the accuracy and precision of CrVI analyses given different pH's and carbon concentrations.	accuracy. See also response to TRC's (Win Wright) memorandum dated December 9, 2013, included in **Attachment O**, at the end of this table				Comment resolved.	
729	FMIT-188 Hualapai-139 Chemehuevi-139 Cocopah-139 CRIT-139	Append L-Vol 2 Section 7.1 p. 7-2	Cr(VI) samples should be preserved using added basic solution, raising the pH so that no Cr(VI) reduction would occur, and standard operating procedures from the 60% design report (SOP-L1 and –A6) are cited.	Many of the groundwater samples collected will have elevated carbon concentrations. As soon as a water sample is pumped from a well, reactions can be accelerated due to changes in dissolved oxygen and temperature, and Cr(VI) reduction could take place in the sample bottle, possibly giving a false reading. Even if a basic preservative is added, Cr(VI) reduction is known to occur in natural high pH waters. Bench tests and matrix spikes could be done to determine the accuracy and precision of Cr(VI) analyses given different pHs and carbon concentrations.	For groundwater samples, an inline filter is situated at the tip of the hose/ tube directly before the sample enters the pre-preserved sample container. Very little oxygen is introduced during the process and in fact, oxygen actually reacts with Ferrous iron inhibiting/slowing the reduction of Cr(VI) to Cr(III). Once the sample container is full the container is capped, placed in a zip-lock bag and placed on ice in a cooler. Reducing the temperature (ground water temperature is generally in the mid 80°F – 90°F) of the sample slows down any possible chemical or biological reactions. In addition the buffer solution (specified by EPA method 218.6) is not just for raising the pH but is designed to stop any reaction that might be occurring and provides a 28 day holding time.			Comment resolved.	This comment and response were discussed with the Tribes and TRC at the November 5, 2013 TWG meeting. TRC (Win Wright) presented final information at the February 12, 2014 TWG meeting (see additional info to **Attachment O**). Comment resolved.	Not applicable
730	Hualapai-140 Chemehuevi-140 Cocopah-140 CRIT-140	Append L-Vol 2 Section 7.1 p. 7-2	Field analyses of unstable constituents	Dissolved sulfide analyses may not be necessary for routine monitoring; however, sulfide measurements help to describe geochemical end products and electron acceptors. In addition to sulfide, the IRZ will generate hydrogen gas, and it is known that H2(g) is explosive. Collection and analysis of end-products could help verify geochemical modeling results.	Hydrogen sulfide will be periodically monitored in the on-site lab as a means to monitor subsurface conditions and understand how the process of reducing the Cr(VI) is progressing. The formation of hydrogen gas is not anticipated to be an issue. When in-situ treatment was first being introduced as a treatment for ground water contamination, the fear of excess hydrogen gas being produced at explosive levels was common. However, over time it has been shown that although hydrogen gas is produced it is not typically produced at explosive levels. Extra care needs to be taken in cases where hydrogen gas and hydrogen sulfide can displace the air such as confined spaced (e.g., well vaults)			Comment resolved pending review of 90% design documents.	Comment resolved	Not applicable

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731	FMIT-189 Hualapai-141 Chemehuevi-141 Cocopah-141 CRIT-141	Append L-Vol 2 Section 7.1p. 7-2	*Preservation and analysis of samples, unpreserved FeII samples can be transported for lab analyses.*	Oxidation of Fe(II) to Fe(III) is on the order of hours to days. Samples for Fe(II) concentration need to be analyzed immediately, or preserved using hydrochloric acid (HCl), then analyzed within a couple of days of sample collection. Samples for dissolved sulfide (S(II)) cannot be preserved, and need to be analyzed as soon as possible after sample collection. It is widely known that iron colloids can pass through a 0.45 micrometer filter (e.g. in water from turbid or muddy wells); therefore, turbid samples should be flagged. Protocols for turbid samples could include use of smaller filter sizes (e.g., 0.2 micrometers).	For Ferrous iron, a sample is treated with 1, 10-phenanthroline (HACH packet) at pH 3 to 3.5. Molecules of the phenanthroline chelate each atom of ferrous iron to form an orange-red complex. The colored solution obeys Beer's law; (concentration is proportional to the color intensity and is independent of pH as long as the pH is between 3 and 9. A pH between 2.9 and 3.5 ensures rapid color development in the presence of an excess of phenanthroline. The HACH packets are designed to acidify and provide the phenanthroline needed for the reaction, so adding additional HCl would drive the pH below the desired pH needed for the analysis and cause erroneous results. Samples should be field filtered, stored on ice or in a refrigerator and analyzed the same day as collection. Because the reaction is specific to ferrous iron, ferric iron colloids do not react with the phenanthroline.			Comment resolved.	This comment and response were discussed with the Tribes and TRC at the November 5, 2013 TWG meeting. TRC (Win Wright) presented final information at the February 12, 2014 TWG meeting (see additional info to **Attachment O**). Comment resolved.	Not applicable
732	DOI-292	Section 7.2, Page 7-4	"Surface water, groundwater, and process water sampling will be performed in accordance with the following SOPs . . ."	Regarding the Preparation and Set-up section of SOP-A14, will the SOP delineate the requirement of providing a safety flotation vest to each individual in a boat?	Safety flotation vests are listed in the preparation and setup section of SOP-A14. The forthcoming Topock Program Health and Safety Plan (draft at 90% design) will include expanded information on health and safety requirements. In addition to the program wide requirements/policies, it is expected that each contractor will have its own health and safety plan for their contracted work.		Comment resolved pending review of 90% design.		Comment resolved.	Not applicable
733	DOI-293	Section 7.5, Page 7-6	General Comment	Will field sampling personnel receive training on sampling techniques specific to this project?	As with current project practice, field sampling personnel will be trained on sampling procedures using project-specific SOPs.		Comment resolved.		Comment resolved.	Not applicable
734	DOI-294	Appendix A, SOP A-4, Page 1 of 5	"2) Applicable project work plan or monitoring plan."	The in-text citation for this is CH2M HILL, 2012; however, there are three references in the Reference list (CH2M HILL 2012a, CH2M HILL 2012b, CH2M HILL 2012c). Suggest that this in-text citation should be CH2M HILL 2012a.	Comment noted. Since the QAPP and QAPP Addendum could be updated over time without materially affect the SOP, it is suggested that the referenced in-text citation be removed from this SOP.		Comment resolved.		Comment resolved.	O&M Manual Volume 2 SOP A-4

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735	DOI-295	Appendix A, SOP A-6, Page 1 of 3	"2) Applicable project work plan or monitoring plan."	The in-text citation for this is CH2M HILL, 2012; however, there are three references in the Reference list (CH2M HILL 2012a, CH2M HILL 2012b, CH2M HILL 2012c). Suggest that this in-text citation should be CH2M HILL 2012a.	See response to comment #734 DOI-294.		Comment resolved.		Comment resolved.	O&M Manual Volume 2 SOP A-6
736	DOI-296	Appendix A, SOP-B16, Page 1 of 6	"This SOP describes the analysis of in-situ and ex-situ soil samples . ."	The in-text citation is CH2M HILL 2005; however, this item is not listed in the Reference list.	The following reference will be added to Section 8 of Volume 2 (pages 8-1 and 8-2): "CH2M HILL. 2005. *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program*."		Comment resolved.		Comment resolved.	O&M Manual Volume 2 Section 8
737	DOI-297	Appendix A, SOP-B16, Page 2 of 6	XRF Soil Analysis Documentation	The in-text citation is CH2M HILL 2005; however, this item is not listed in the Reference list.	See response to comment #736 DOI-296.		Comment resolved.		Comment resolved.	O&M Manual Volume 2 SOP B-16
738	DOI-298	Appendix B	General Comment	Does PG&E plan on auditing offsite laboratories?	Laboratory audits will be conducted to ensure compliance with the PG&E Program QAPP and its Addendum (Volume 2, Appendix B).		Comment resolved.		Comment resolved.	Not applicable
739	DOI-299	Appendix B	General Comment	Please address several questions related to river sampling procedures: • Will field data include river clarity, weather conditions, and river stage data? • Will the boat be anchored and the engine turned off prior to sampling? • Should bottom sediment be disturbed during sample preparation in the field, will time be allotted for settling to occur?	These topics are addressed in SOP-A4 as follows: • The field sheets do include weather conditions. One of the parameters is turbidity so clarity is recorded. River depth is also recorded at each location prior to sampling; no other river stage data is recorded in the field. • The boat is always anchored, but the engine is not always turned off in case there is an issue of dragging during the course of sampling. For this reason, ambient blanks are collected as a QC measure. In addition, the motor is always downstream of the sampling location since the boat is always pointed upstream. There is typically heavy boat traffic on the river so the motor is left running at all times as a safety precaution in case emergency avoidance action must be taken. • Sediments are generally not disturbed as the river water is typically traveling at 8-9 miles per hour. There are typically little to no sediments due to the speed of the river current. The river bottom is typically		Comment resolved.		Comment resolved.	Not applicable

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					rocky/sandy. Any sediments that are disturbed when the anchor is set are instantly carried away by the current long before any samples are collected.					
740	DOI-300	Appendix B, Section 1.0, Page 1		The section includes an in-text citation for CH2M HILL 2012; however, there are three CH2M HILL references in the Reference list (CH2M HILL 2012a, CH2M HILL 2012b, CH2M HILL 2012c). It seems that this in-text citation should be CH2M HILL 2012a.	The reference section 6.0 (Page 6 of Appendix B) only lists one 2012 reference.		Comment resolved.		Comment resolved.	Not applicable
741	DTSC-232	Appendix L O&M Plan Volume 2, Appendix B, 3.4 Additional QC Steps for Hexavalent Chromium in Select Floodplain Well Samples, Page 3	In addition to the QC steps discussed in Section 3.3, the additional QC steps outlined in this section will be followed during sampling of a) monitoring wells located in the floodplain that are currently non-detect (or detected at less than 5 parts per billion) for Cr(VI), and b) future floodplain wells as determined by the CH2M HILL project chemist. The applicable floodplain wells are listed in Exhibit 3-2. As water quality changes, the list of wells in Exhibit 3-2 will be reviewed periodically (initially on an annual basis) and updated as applicable.	Include the rationale for requiring additional QC steps in select floodplain wells. Note that wells MW-21 and MW-55 are not necessarily floodplain wells.	As an additional QC step, extra containers and equipment blanks (EBs) are collected to help determine the source for any possible anomalous results found in the listed wells. All the wells located near the river (specifically those around the active reducing zone) are susceptible to colloidal suspension of chromium which can cause a high variability between the Cr(T) and Cr(VI) results. The special EBs are collected to eliminate the possibility of cross contamination between the wells (i.e., to verify that carry over is not occurring). The MW-55 and MW-21 wells are not necessarily in the floodplain, but are located in areas “near” the river where the “normal” results are either non-detect or low concentrations. In the event results are “detected” higher than normal or where the Cr and Cr(VI) concentrations differed more than is considered normal, PG&E works to determine the likely causes and provide the analysis in the report where the results are reported.	Isn’t this true of most wells? Need to elaborate Seems like this should apply to all site wells with low level detections (less that ~5-10 ppb). Comment resolved.			The additional QC steps were put into place due to the sensitive nature of the sample locations, where low level detections could have large implications if shown to be correct. The additional QC steps are of little use for wells in the uplands where slight differences of a few ppb are of less concern, especially where the sample concentration is less than the background concentration. At the same time, samples with concentrations greater than 10 – 15 ppb can have sufficient variability within the analytical methods to exceed the possible influence from contamination sources or colloidal suspension concentrations. This discussion will be incorporated into the 90% design document. Comment resolved.	O&M Manual Volume 2 Apdx B Section 3.3

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742	DTSC-233	Appendix L O&M Plan Volume 2, Appendix B, 3.5 Additional QC Steps for Cr(T) and Cr(VI) — River Samples, Page 4	For surface water sampling events; three analyte-specific sample containers will be collected from each sample location for both total chromium (Cr[T]) and Cr(VI). The laboratory will analyze the initial sample aliquot; if that result is considered “suspect” (any detected concentration in the river will be considered suspect), an additional aliquot of the original sample will be reanalyzed along with an aliquot from each of the additional sample volumes for comparison purposes.	“Suspect” detections should also be reported with qualifier for trend analysis in standard reports.	Three containers are collected and provided to the laboratories for cases of unexpected detects in the initial analysis. When a “suspect” result is initially obtained by the laboratory, the laboratory performs analyses on all sample containers in an attempt to determine if the initial result is correct or if it is a laboratory “artifact” (contaminate). In either case, the laboratory will report the result determined to be the most accurate, and that is the result that is validated and reported to the agencies. To date, all the “suspect” or anomalous results have been related back to a contamination issue in the laboratory. PG&E will work with the laboratory to ensure a more detailed case narrative is provided whenever an anomalous result is encountered.	Shouldn’t this be included in laboratory exception report? DTSC is requesting that “Suspect” detections also be reported with qualifier for trend analysis in standard reports. PG&E shall comply with the Agency directive letter dated April 4, 2014 with regards to sampling methodology and data reporting. Comment resolved			Comment resolved.	O&M Manual Volume 2 Apdx B Section 3.4
743	DTSC-234	Appendix L O&M Plan Volume 2, Appendix B, 4.0 Method Quality Objectives and Quality Assurance Program, Page 5	See Tables 4-1 through 4-3 for project specific reporting level requirements and EPA/ California screening-level information that may differ from the QAPP.	Please screen Table 4-2 QAPP RLs and identify those RLs that are greater than MCLs. Select analytical methods that can attain MCL reporting limits.	See revised Table 4-2 – two columns (I and J) have been added to include Federal and California MCLs. Currently all analytes with California MCLs have RLs that are below or at the MCLs. Five organic analytes have federal MCLs below the listed RLs – they are 1,2-Dibromo-3-Chloropropane; 1,2-Dibromoethane (EDB); bis (2-ethylhexyl) phthalate; Hexachlorobenzene; and Pentachlorophenol. To lower the RLs for these five analytes, water analysis would need to be performed using the USEPA drinking water methods by a laboratory certified for those methods. However, the	Okay, pending review of revised table.			Comment resolved	O&M Manual Volume 2 Apdx B Table 4-2

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					drinking water methods are not generally used for groundwater monitoring and are not approved under the "40 CFR Parts 136, 260, 423, 430, and 435 - Federal Register / Vol. 77, No. 97 / Friday, May 18, 2012 / Rules and Regulations.					
744	DOI-301	Appendix B, Section 4.1.1, Page 5	"RLs should be a minimum of two times greater than the calculated MDLs."	Table 4-1 indicates that the Cr (VI) RL exceeds the most stringent screening criterion. There should be some discussion on the acceptability of this situation.	Screening levels are established by use of statistical analysis and are not based on the analytical capabilities of laboratories or methods. The 0.4 mg/kg RL used for this project is currently the lowest RL achievable using SW7199/3060A and is well below the industrial soil screening level. Text will be included in the 90% BOD to reflect this response.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Apdx B Section 4.1.1
745	DOI-302	Appendix B, Section 6, Page 6		The following items are on the Reference list but are not referenced in the text: DTSC 2008, CH2M HILL 2007, USEPA 1999, USEPA 2000, and USEPA 2009.	Since the QAPP Addendum will be updated to incorporate changes to Tables 4-2 (see response to comment #743 DTSC-234) and 4-3 (see response to comment #747 DOI-304), Section 6 will also be updated to remove the references listed in the comment.		Comment resolved.		Comment resolved.	O&M Manual Volume 2 Apdx B Section 6
746	DOI-303	Appendix B, Section 6, Page 6		Not all of the references on Page 6 are found in Appendix B. Also, is this reference list different from the reference list for the main text, found on Pages 8-1 and 8-2?	Since the QAPP Addendum is a stand-alone document, it has its own reference section, separate from the reference section for Volume 2 (pages 8-1 and 8-2).		Comment resolved.		Comment resolved.	Not applicable
747	DOI-304	Appendix B, Table 4-3		Please provide RLs for the organic analytes.	Table 4-3 has been revised to include RLs for the organic parameters.		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 2 Apdx B Table 4-2
Specific Comments – Appendix L – Volume 3: Contingency Plan										
748	DTSC-235	Appendix L, Volume 3, Section 1.0 Introduction		Category A under FMEA should not only be limited to attainment of final RAO. PG&E should define short term goals and process to monitor for attainment of these short term goals. Nonattainment should then trigger corrective actions through contingency planning. These short term goals should be specified in 60% design contingency planning (e.g. by production formation that is not dissipated or reverted in expected time frame according to model, undesirable or unexpected changes in geochemical quality of water in injection, extraction and production wells).	Unacceptable remedy performance (Category A) of the FMEA is defined as "Remedy does not meet RAOs, cleanup goals, design objectives, or otherwise perform as required," which is inclusive of shorter term performance objectives. The Sampling and Monitoring Plan (Appendix L, Volume 2) establishes detailed performance metrics to ensure that the system is meeting the short term performance objectives of (1 establishing the NTH IRZ while controlling byproduct generation, (2) establishing hydraulic control as needed for Cr[VI] and byproducts in the deep zone of the aquifer, and (3) flushing of the	See response to comment #38 DTSC-6.			Comment resolved.	Not applicable

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					plume. Operational flowcharts for obtaining these goals are provided in the Sampling and Monitoring Plan. The flowcharts also specify contingency measures when adaptive operations are not sufficient to meet the performance objectives.					
749	DTSC-236	Appendix L, Volume 3, Section 1.0 Introduction	Causes of potential failures are mitigated in the design process, in adaptive operations, and/or in corrective action/ contingency response planning.	PG&E places heavy emphasis on adaptive operations to mitigate potential failures as can be seen in many of the FMEA tables that refers back to the O&M plan and sampling plan. DTSC is concerned that the range of operational adjustments may not be sufficient to mitigate the need for contingencies. For example, based on current design, there are only very limited numbers of additional wells that can be installed before reaching the total 170 well count, as PG&E install injection wells near the boundary of the plume at IRLs, the concentrations for Cr6 or other key compounds may not be below background, would that difference change the assumption of the predicative model, and how much latitude would PG&E have to move the IRL injection wells? What would PG&E do then?	Based on available data, PG&E anticipates that the proposed IRL locations (IRL-1 through IRL-4) are outside of the baseline hexavalent chromium plume (i.e., as defined by the 32 ppb background concentration). If, during the installation of these wells, it is identified that the hexavalent chromium plume extends further to the northwest in these areas than currently understood, PG&E would consider several alternatives. Alternatives that could be considered include well relocation, amendment of water injected into the IRL well with TOC to enhance hexavalent chromium treatment within the immediate vicinity of the well (if concentrations are near 32 ppb), or other alternatives. A contingency plan will be included in the Construction/Remedial Action Work Plan.	Comment resolved pending review of the 90%.			Comment resolved.	Construction/Remedial Action Work Plan Sections 3.2 and 5.
750	DTSC-237	Appendix L, Volume 3, Section 1.0, Category D	Changes (such as visual impact) that necessitate re-opening the EIR process.	DTSC would not be "re-opening the EIR process." The proper procedure would be to consider the additional CEQA impacts that have either not been identified or with a condition that was not anticipated. Either case, it would not be re-opening a CEQA decision, but to conduct additional CEQA analysis based on new information received.	Comment noted. PG&E understands that under CEQA, DTSC would determine whether new information meets any of the conditions listed in Public Resources Code section 21166. Text in the referenced section will be revised in the 90% design to reflect the above CEQA process.	Comment resolved.			Comment resolved.	O&M Manual Volume 3 Section 1 and all FMEA tables.
751	DOI-305	Table 1.0-1		In the cells for Categories D and E, Severity of Effect 2 and 3, the test states "See A". Please define.	Text in the cited cells will be corrected to state "Not defined".		Comment resolved.		Comment resolved.	O&M Manual Volume 3 Table 1.0-1.
752	DOI-306	Table 2.1-1	General Comment	What will PG&E's response be should the capture zone not be as extensive as predicted?	Appendix L, Volume 1 (O&M Plan) and Volume 2 (Sampling and Monitoring Plan) describe the decision rules and framework for the adaptive remedy operations that will be used to achieve the remedy objectives, including those for plume control. Volume 3 (Contingency Plan) outlines PG&E's response approach	See response to comment #655 DTSC-201.	Resolved.		PG&E will work on items related to this comment as directed in the Agencies' direction letter dated April 4, 2014.	Not applicable

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					should the adaptive procedures in Volumes 1 and 2 not achieve the remedy objectives. The following DQOs listed in Table 2.1-1 of the Sampling and Monitoring Plan (Appendix L, Volume 2) specify the decision rules for evaluating plume control and the adaptive operations framework that will be implemented if this evaluation indicates that plume control is not adequate: NTH IRZ DQO-4, IRL DQO-3, IRL DQO-4, TCS DQO-2, and TCS DQO-3, as outlined on the flowchart figures that are referred to in Table 2.1-1 for each DQO. Operational adjustments and activities listed in the flowcharts include, but are not limited to, increasing flow rates or altering the flow balance of the system, and bringing provisional wells on-line. See also response to comment 655 DTSC-201.					
753	DOI-307	Table 2.1-1, Conveyance (General)		In Table 1.0-1, Category E effect is not defined for severity level 4, yet for the release from the conveyance pipeline, it is defined. For the failures with severity level 2, none of the categories are checked which is inconsistent with Table 1.0-1. The rationale appears to be due to the low likelihood of the event, but likelihood is a different criterion. The logic in Table 1.0-1 as applied to the Section 2 tables needs clarification.	PG&E will clarify the application of Table 1.0-1 (Appendix L, Volume 3) in the 90% submittal.		Resolved pending review of the 90% design.		Comment resolved.	O&M Manual Volume 3 Section 1 O&M Manual Volume 3 Table 1.0-1
754	DTSC-238	Appendix L, Volume 3, Table 2.1-1	Release from conveyance pipeline	DTSC notes that only limited sections of the pipeline will be double walled. Furthermore, human observation of slow leaks with below ground pipes are unlikely. DTSC recommends a more robust leak detection system throughout the conveyance pipeline. PG&E must log all occurrences of these failures (leaks, fouling, clogging, and releases to wells, etc.), identify remedial measures taken and conduct periodic evaluations (i.e. 5 year reviews) to determine if a change in design would be necessary based on frequency of occurrence. This approach should be applied to all potential failures and detailed in periodic remedy performance reports	As described in Appendix C, Section C.5.1, conveyance pipelines will be single-walled unless the pipe is used to convey: (1) groundwater or remedy-produced water that exhibits the hazardous waste characteristic or (2) concentrated carbon substrate. In these cases, double-walled piping will be used. Double-walled pipe segments will include appropriately designed leak detection systems. Additionally, pipeline segments installed within belowground concrete trenches will be designed with leak detection at low points. Conveyance system maintenance Standard Operating Procedures will be provided in the 90% Design Submittal and will include maintenance, inspection, and logging	Okay, please also see comment #559 DTSC-157.			Comment resolved.	O&M Manual Volume 3 Table 2.1-1

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				to be submitted to agencies.	procedures. O&M Manual Exhibit L2.2-3 provides the preliminary communication framework, including communication of potential releases. As described in Appendix L, Volume 3, Table 2.1-1, PG&E is taking several measures in the design and planned operations to mitigate potential leaks, releases, or other failures of the conveyance pipelines. Should leaks, releases, or other failures be identified during remedy implementation, potential improvements will be evaluated at that time.					
755	DOI-308	Table 2.1-1, Remediation Wells (General)	"Extraction Well Failure."	Is it possible for the water in the Colorado River to overflow its banks to the extent that it would impact the River Bank extraction wells?	As indicated on Page 10 of Table 2.1-1 under "Flooding", remedy infrastructure has been designed to be located outside of the ordinary high water mark and 100-year floodplain to the extent possible. The proposed River Bank Extraction Well locations are outside of the ordinary high water mark and 100-year floodplain. It is therefore not considered likely that Colorado River flooding would impact River Bank Extraction Well operation.		Resolved.		Comment resolved.	Not applicable
756	DOI-309	Table 2.1-1, NTH IRZ	"Extraction of organic carbon and/or significant byproducts."	Treatment of extracted river bank groundwater to remove carbon and byproducts should equate with all unacceptable conditions being checked.	PG&E does not anticipate that treatment of extracted river bank groundwater will be required, and this potential is being mitigated in several ways through the design and planned operations, as described in Table 2.1-1. If these efforts are not successful and treatment is required, it is expected to have a significant cost increase (i.e., unacceptable condition) as defined in Table 1.0-1. However, although treatment is considered undesirable, it would not be expected to cause unacceptable conditions A, B, D, or E as defined in Table 1.0-1. No changes to Table 2.1-1 are proposed.		Comment resolved.		Comment resolved.	Not applicable
757	DTSC-239	Appendix L, Volume 3, Table 2.2-1, Remedy produced water management system	4. Poor Quality Water to Wells: presence of scaling ions or high pH water	PG&E states that one mitigation in design is to "add conditioning units, if needed." Are these contingency designs currently included in remedy produced water conditional plant? If not, addition of units in future will likely trigger additional CEQA evaluations.	To facilitate CEQA evaluation of the 90% design, PG&E will include general information on contingency conditioning units to address scaling ions (primarily manganese, iron, magnesium, and calcium) in the 90% design. This information will include unit description and estimates of footprint, chemical use, electricity use, and waste generation.	Okay pending review of the 90% design.			Comment resolved.	O&M Manual Volume 3 Section 2.2 and Appendix A.

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758	FMIT-190	Table 2.2-1		This chart is also troubling as it lists Re-Opening of EIR as a type of "Unacceptable Condition." It is the Tribe's view that more flexibility should be given regarding this potential: if there are alternate designs, methods, mitigation that could reduce impacts/effects to cultural resources but might reopen the CEQA or other process, they should be analyzed on their merits - not potentially summarily rejected by PG&E or the agencies because it could reopen an EIR, etc. Please clarify if DTSC's position is that re-opening of an EIR, etc., no matter the context, is an unacceptable condition and if so, the basis for DTSC limiting its future discretion in this manner regardless of future circumstances. The chart also lists "Significant Cost Increase" as a type of "Unacceptable Condition." Please clarify if DTSC's position is that cost increases to the PRP, is an unacceptable condition. Do DTSC and DOI agree with the PRP on what a "significant" cost increase is? Might that metric not change under different circumstances and contexts? Again, what is the basis for the agencies limiting their lawful discretion in the future based on cost alone, which is only one criterion under the law for making decisions under applicable law and ARARs?	This chart has factors that PG&E's engineers consider as they design the remedy. With respect to DTSC's position, PG&E defers to DTSC. PG&E's understands this entry on the chart as intended to indicate that one of the design parameters is consistency with the remedy that was selected based on the EIR, and avoiding the need to redo or reopen the EIR process. PG&E recognizes that DTSC will review the final design in compliance with CEQA. PG&E likewise defers to DTSC and DOI for their position on the cost effectiveness factor. From PG&E's perspective, cost effectiveness is one of the evaluation criteria required by RCRA and CERCLA in the CMS/FS process. In the CMS/FS, the selected remedy was scored medium for cost effectiveness, other alternatives that received a similar score have an estimated cost of $7M to $41M more than the selected remedy (see Table 5-7, page 5-85). Therefore, for the purpose of contingency planning for the remedy, PG&E defines potential causes for the remedy to increase in cost by more than $10M to $50M as conditions that need further agency discussion to allow PG&E to consider the most cost effective options for preventing a failure event.				PG&E's response was discussed with the FMIT, and revised in response to that discussion.	Not applicable
759	FMIT-191	Note 1		Note 1 is unclear as to whether the described trucking is within or outside of the groundwater EIR scope. Please clarify.	The 60% design includes an automated backwashing and conditioning system that, when operated as designed, will minimize the amount of trucking needed during O&M. The design is consistent with the certified EIR. For clarity, Note 1 will be revised as follows: "Anticipated annual remedy-produced water volume is 7.6 million gallons (MG) per year. With provisional wells this volume could increase to 10 MG per year. The automated backwashing and conditioning system has been designed to accommodate this range	For Note 1, PG&E cited Section 3.5.3, Operation and Maintenance of the project. The FEIR assumed that there will be periodic maintenance activities associated with the remedy that would require additional vehicular traffic. Although the FEIR did not specifically consider the contingency generated vehicular traffic, the FEIR did consider the cited level of traffic as part of the project.		Comment noted.	Noted.	O&M Manual Volume 3 Table 2.2-1.

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					of anticipated volume of wastewater. If the system functions as designed, the amount of trucking needed during O&M would be minimal, and within the range analyzed in the certified EIR (see Section 3.5.3, page 3-26)."					
760	DTSC-240	Appendix L, Volume 3, Table 2.3-1, Freshwater Supply	Possible Contingency Measures	PG&E did not acknowledge DTSC's requirement for PG&E to include a pre-treatment plant as contingency. Instead, PG&E specifies seeking other sources of freshwater. DTSC would clarification from PG&E on possible additional freshwater locations that have not already been considered by PG&E in the current Freshwater Implementation Plan. Also, PG&E identifies provision of "alternate water supply for affected water users" as a contingency for freshwater pumping causing effects on water quality or capacity in nearby wells. **This is beyond the terms of DTSC's approval of the proposed remedy.** DTSC's approval is conditioned on PG&E's operation not impacting nearby wells.	PG&E interpreted DTSC's direction in the 12/31/12 letter as to include a pre-injection treatment system in the 60% design for actual remedy implementation, and not as a contingency. Therefore, the system was not included in the "Possible Contingency Measures" column in Table 2.3-1. However, as directed by DTSC (#21 DTSC-2), PG&E will design an arsenic only freshwater pre-injection treatment system and this will be included in the 90% design as a contingency. PG&E only listed possible contingency measures in Table 2.3-1, but did not develop these measures. At this time, PG&E has not considered additional locations outside of those included in the Alternative Freshwater Source Evaluation. This possible contingency measure will be deleted.	Okay. DTSC notes the length of time it has taken to site and evaluate the current site B alternative freshwater source location and cautions that this contingency measure may be lengthy. Furthermore, it is DTSC's interpretation that PG&E should test and monitor for conditions that may impact quality, not just quantity, of water to nearby wells.			Comment resolved.	O&M Manual Volume 3 Table 2.3-1 and Appendix B.
761	DTSC-241	Appendix L, Volume 3, Table 2.4-1, Power Supply	Utility or generated power supply failure	As part of DTSC's remedy approval condition, PG&E is required to "rent or otherwise obtain a single new primary 320 kW generator, of similar make and model of the existing generator (Isuzu Model 6WG1X), for purposes of providing backup electricity when needed at the site for implementation of the approved project." (see remedy approval letter to Yvonne Meeks, January 31, 2011)	Text under the column titled Mitigation-Design will be clarified as follows: "Interconnection to other source(s) of generated electrical power, connection point to <u>dedicated</u> portable generator".	Okay.			Comment resolved.	O&M Manual Volume 3 Table 2.4-1.
762	DOI-310	Table 2.5-1	General Comment	What are the potential consequences if alarms do not signal the SCADA system?	For the SCADA to not get alarms, it would mean that there was a loss of communications which results in loss of status, control, and alarms. In this system, individual wells and other loads do not operate on their own and must be connected to the main SCADA for instruction. Therefore, if communications are lost, systems are shut down. The system design includes layers of protection against such consequences that will be		Comment resolved pending review of 90% design.		Comment resolved.	O&M Manual Volume 3 Table 2.5-1.

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					described in more detail in the control systems narrative planned for inclusion in the 90% design. In general, the following elements are included in the design: • Motors and valves go to safe positions following failure. • Local devices are controlled by local PLCs. • The SCADA will continuous monitor to verify signals are being received. • The SCADA will also confirm (every 1 to 3 minutes) and verify that there are no alarm conditions that should cause a device to be turned on or off.					
Specific Comments – Appendix L – Volume 4: Soil Management Plan, including Appendix A Groundwater Remedy Implementation – Baseline Soil Sampling and Analysis Plan										
763a	FMIT-192		General comment	It is requested that PG&E evaluate the use of displaced soils for the development of a soil/plant nursery in place of or in addition to the use of stockpiles. This approach would provide habitat for displaced seeds and plants and would better ensure that the biological integrity of the soil is maintained over potential long-term storage. If the development of a nursery is decided to not be a viable option it is further requested that the rationale behind the decision be clearly provided to the Tribe.	Salvage of topsoil during installation of linear utility features is a common practice for PG&E and will be done where the proposed excavation will occur in areas where undisturbed topsoil may be present. In such areas the upper 4 inches of soil will be carefully removed and placed near the excavation. The remaining sub-soil will then be excavated and stored separately from the topsoil. Following the installation of the pipe and backfilling of the trench the topsoil will be replaced over the trench. Therefore, there will be no need for long-term storage of undisturbed topsoil. As for the rest of the excavated soils that are not undisturbed topsoil, these desert soils in general are low in nutrients and organic matter and soils such as these that have been subject to disturbance typically lose a large percentage of the available nutrient supply and important soil biota. Therefore there is no ecological benefit associated with the salvage of soils from existing disturbed areas and such soils would not be suitable for the establishment of a native plant nursery. Additionally, one of the primary goals of the remedy design is to avoid and minimize disturbance to special-status plants, and therefore a careful analysis of the 60% design			Comment resolved.	Comment resolved	Not applicable

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					was conducted to determine areas where the impacts to culturally significant annual plants may occur. Based on the analysis, it was determined that less than one percent of the proposed pipeline will be located in undisturbed habitat. It was therefore determined that the amount of impacts to native vegetation does not warrant the need for an onsite nursery. PG&E does not believe that a nursery, based on using unsuitable displaced site soil is a viable option.					
763b	Hualapai-142 Chemehuevi-142 Cocopah-142 CRIT-142		General comment	It is requested that PG&E evaluate the use of displaced soils for the development of a soil/plant nursery in place of, or in addition to, the use of stock-piles. This approach would provide habitat for displaced seeds and plants and would ensure that the biological integrity of the soil is maintained over long-term storage. If the development of a nursery is decided to not be a viable option it is further requested that the rationale behind the decision be clearly provided to all stakeholders.	See response to comment #763a FMIT-192.			Comment resolved.	Comment resolved.	Not applicable
764	FMIT-195	Section 1		First paragraph is unnecessarily vague about when PG&E will receive approval to decommission and remove the IM3 system. The recent settlement between the Tribe and DTSC sets forth specific criteria for the decommissioning of the IM-3 treatment plant. A specific even milestone should be established for the determination of whether those criteria have been achieved. It should also be revised to reflect that displaced soil can be a project resource, particularly regarding the plant technical report which acknowledged the value of the duff, etc., for restoration.	The second sentence of the first paragraph will be revised as follows: "~~At some point during the implementation of the groundwater remedy, PG&E would receive~~ In addition, after receipt of approval from DTSC, with DOI's concurrence, PG&E will decommission and remove the Interim Measures No. 3 (IM-3) Groundwater Extraction and Treatment System (referred to herein as the "IM-3 system")." Regarding the use of displaced soil as a project resource, see response to comments #763a FMIT-192, #763b Hualapai-142, and #774 FMIT-193/Hualapai-143.			Review in progress. Comment resolved pending review of the 90% design.	This comment and response were discussed at the December 17-18, 2013 TWG meeting.	O&M Manual Volume 4 Section 1.
765	DOI-311	Section 1, Page 1-2	"Soil and material originating in or near Soil RFI/RI	Because much of the soil that is displaced that is not in or near Soil RFI/RI Investigation Areas is from along roadways, where there is a potential for lead and PAH	Polycyclic aromatic hydrocarbons (PAH) and lead analysis in surface soil along the groundwater remedy pipeline and structures outside Soil RFI/RI Investigation areas (areas of		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 1.

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			Investigation Areas . . . "	contamination, the soil should not be reused within the APE until it is appropriately tested. Please clarify.	known or suspected soil contamination) and along roadways will be added to the baseline soil sampling proposed in Appendix A of Volume 4, Soil Management Plan to pre-characterize the surface soil prior to construction. Text will be revised as follows (inserted verbiage shown in underline typeface; deleted text shown in ~~strikethrough~~ typeface): "… Displaced soil and material originating outside areas of known or suspected contamination ~~are assumed to be uncontaminated and~~ will be pre-characterized prior to remedy construction to identify areas potentially impacted by nearby current and former roadways (PAHs and lead). Displaced soil from areas outside of known or suspected contamination areas that is impacted with PAHs and lead will be handled and managed in accordance with this SMP and the forthcoming HSPs for construction and O&M activities. The uncontaminated soil will be reused as backfill into the same trench or excavation area, if practicable. The uncontaminated soil that cannot be immediately used as backfill may be reused in other areas within the Area of Potential Effect (APE), or stockpiled for future reuse within the APE."					
766	DOI-312	Section 1.2, Page 1-3	"Results from the RFI/RI at the site are being documented in three volumes: . . . "	Should the correct phrase be read as "the results are being documented" or "the results were documented"?	The RFI/RI Volume 3 Report has not been written, so the phrase as currently written is correct "the results are being documented".		Comment resolved.		Comment resolved	Not applicable
767	DOI-313	Section 1.2, Page 1-3	"The SWMUs, AOCs, UAs, and other investigation areas still being characterized in support of the RFI/RI Volume 3 are presented in Exhibit 1.2-1 and shown on Figure 1.0-1."	Could any of these ongoing investigations result in adjustments to the current capture zone and remedial program?	Outcomes of the soil investigation are not expected to result in changes to the proposed groundwater remedial program. Data from the forthcoming supplemental soil investigation will be used to verify this expectation (Soil Investigation Data Quality Objective #3).		Comment resolved.		Comment resolved.	Not applicable

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768	DOI-314	Section 2.2 Page 2-2	General Comment	There is no mention of how soil that is not in or near Soil RFI/RI Investigation Areas will be characterized and managed. Although Section 1 indicates this soil will be placed back in the excavation without characterization or otherwise used in the APE, excess soil used in the APE may require testing. This is of particular concern with excess excavated material from roadways.	Please see response to comment #765 DOI-311. The first paragraph of Section 2.2 will be revised as follows (inserted verbiage shown in <u>underline</u> typeface, deleted text shown in ~~strikethrough~~ typeface): "Soil ~~in or near Soil RFI/RI Investigation Areas that are~~ in the vicinity of the groundwater remedy system expected to be displaced will be pre-characterized following the Groundwater Remedy Implementation—Baseline Soil sampling and Analysis Plan (Baseline SAP), included as Appendix A of this document." The first sentence of the second paragraph will be revised as follows: "<u>Representative sample profile results</u>, existing soil samples, and knowledge of the area history will be used to evaluate waste classification for displaced soil that has not been pre-characterized." The first sentence of the fourth paragraph of Section 2.2 has been revised and a sentence has been added: "The waste characterization samples <u>collected within or near Soil RFI/RI Investigation Area</u> will be analyzed for applicable Soil RFI/RI Investigation Area analytical suite presented in Tables 1.2-1 and 1.2-2. <u>The samples collected outside areas of known or suspected contamination will be analyzed for PAHs and lead.</u>"		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 2, 2.2, 2.3, 2.5, 3, and 3.1.1
769	DOI-315	Section 2.2 Page 2-2	"Soil in or near Soil RFI/RI Investigation Areas that are in the vicinity of the groundwater remedy system . . ."	The first sentence indicates that soil in or near Soil RFI/RI Investigation Areas that are in the vicinity of the groundwater infrastructure will be pre-characterized. Later in the paragraph, the text states that there will be construction and O&M activities in or near Soil RFI/RI Investigation Areas that have not been pre-characterized. Why would soil not be pre-characterized and thus require special management considerations? Although drill cuttings from deep borings may be the appropriate course of action, this	Soil in the vicinity of the groundwater remedy infrastructure will be pre-characterized prior to construction, as stated in response to comment #768 DOI-314. The latter part of the paragraph discusses construction and O&M activities that could occur post-construction of the remedy as part of routine O&M, which is not part of the pre-characterization presented in Appendix A of Volume 4. In addition, pre-characterization of soil in the vicinity of groundwater remedy infrastructure will not be possible in		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 2.2

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				needs to be stated here to minimize confusion. Please clarify.	areas of IM3 and the MW-20 bench where specific IM3 facilities will be reused in the final remedy. The sentence has been clarified as follows (inserted verbiage shown in <u>underline</u> typeface, deleted text shown in ~~strikethrough~~ typeface): "Soil generated during <u>post</u>-construction ~~and~~ O&M in or near Soil RFI/RI Investigation Areas that have not been pre-characterized and during the decommissioning and removal of the IM-3 system <u>infrastructure used for the groundwater remedy</u> will be stockpiled or placed in lined roll-off bins at the work site, if practicable, or onsite in a temporary storage area designated by PG&E until they have been characterized."					
770	DOI-316	Section 2.2 Page 2-2	"The baseline soil sampling results will be screened following the process described below . . . "	The text refers to Section 2.4 regarding classification of displaced soil. The correct reference should be to Section 2.3.	The text will be revised as suggested.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 2.2
771	DOI-317	Section 2.2, Pages 2-2 and 2-3	"Existing soil sample results and knowledge of the area history will be used to assess waste classification for displaced soil that has not been pre-characterized."	It should be clearly stated that drill cuttings from individual waste sites (AOCs and SWMUs) will be segregated. Comingling of waste from different impacted locations into a single storage container should not be considered.	A sentence has been added to the fifth paragraph of Section 2.2: "Drill cuttings from new monitoring, extraction, and injection well locations will not be fully characterized as part of the Baseline SAP; therefore, drill cuttings from monitoring wells installed in or near Soil RFI/RI Investigation Areas will be containerized in 55-gallon U.S. Department of Transportation (DOT) drums or lined roll-off bins. <u>Drill cuttings from individual RFI/RI Investigation Areas will be segregated to prevent comingling of waste.</u> The drill cuttings drums/bins will be stored onsite in a temporary storage area designated by PG&E until they have been characterized. Drum and roll-off bin storage are described in Section 3.1."		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 2.2
772	DOI-318	Section 2.2, Pages 2-3	"Characterization of drilling cuttings will be performed by collection of	What criteria will be used to determine if one discrete sample per drum is taken or if one composite per ten drums is taken?	The last paragraph of Section 2.2 will be revised as follows: "Characterization of drilling cuttings will be performed by collection of samples as follows:		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 2.2

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Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design

PG&E Topock Compressor Station, Needles, California

Item	Comment Number	Section/ Page	Reference Text	60% Design Comment	PG&E Response to 60% Design Comments	DTSC Response to 60% Design Comments	DOI Response to 60% Design Comments	Tribe Response to 60% Design Comments	Final Comment Resolution	Where responses are reflected in the 90% design documents?
			one discrete sample per 55-gallon DOT drum or at least one composite per ten drums,… .”		· For one drum, one discrete sample will be collected from the drum. The sample will be collected from the center of the drum from at least 12-inches below the surface of the soil. · For 2 to 10 drums, one discrete sample will be collected from each drum and composited into a single composite sample. · For more than 10 drums, one composite sample will be collected for every 10 drums. · For each roll-off bin, one four-point composite sample will be taken from the roll-off bin. Samples will be analyzed for applicable Soil RFI/RI Investigation Area analytical suite presented in Tables 1.2-1 and 1.2-2. Analytical results will be screened according to the procedure listed in Section 2.4 to classify the soil for handling, storage, and disposal purposes.”					
773	DOI-319	Section 2.4, Page 2-4		It should be noted that clay found in significant volumes will be set aside for special handling.	A significant amount of clay is not expected to be encountered during the installation of the groundwater remedy infrastructure. The predominant geology at the site consists of alluvial fan deposits on top of sloping bedrock, which is not the geologic environment where clays form. Shallow soil across the site consists mostly of weathered bedrock, sands, and gravel. However, consistent with the special handling procedures requested by the Hualapai Department of Cultural Resources for displaced clay material generated from clay beds (this does not include clay-containing sediment mixtures, only clay beds), PG&E will notify the agencies and Tribes in the event clay bed material is encountered and separated for storage on 100% cotton muslin (dye free) for future disposition. The following text will be added to the first paragraph in Section 2.4 (inserted verbiage shown in <u>underline</u> typeface: “Non-hazardous clean displaced soil will be stockpiled at the work site, if practicable, and recorded in an inventory as described in Section 5.0.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 2.4

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					Clean soil that was removed from trenches or excavations will be reused as backfill into the same trench or excavation area, if practicable. Clean soil that cannot be immediately used as backfill may be reused in other areas within the APE, or stockpiled for future reuse within the APE. Displaced soil that is stockpiled for future use will be managed following the BMP Plan that will be submitted as part of the forthcoming Construction/Remedial Action Work Plan and the Groundwater Remedy O&M Storm Water Pollution Prevention Plan (Appendix E of Volume 1) that will be submitted as part of the 90 percent Basis of Design Report. <u>Consistent with the special handling procedures requested by the Hualapai Department of Cultural Resources for displaced material generated from clay beds (this does not include clay-containing sediment mixtures, only clay beds), if clay bed(s) are encountered during construction, the clay material will be set aside on 100% cotton muslin (dye free) for future disposition, following discussions with the Tribes. PG&E will notify the agencies and Tribes in the event clay material is encountered and separated for storage</u>."					
774	FMIT-193 Hualapai-143 Chemehuevi-143 Cocopah-143 CRIT-143	Sect. 2.4 p. 2-4 and Section 3.1	*Non-hazardous clean displaced soil will be stockpiled at the work site, if practicable, and recorded in an inventory as described in Section 5.0. Clean soil that was removed from trenches or excavations will be reused as backfill into the same trench or excavation area, if practicable.*	Suggested storage for displaced soils that are not hazardous wastes currently include roll-off bins, drums and stockpiles. It is important however to note that much of this stored soil will be returned to the landscape once final project specific soil risk values have been established. If any of this stored soil is replaced on the surface with the anticipation of supporting re-vegetation efforts, it is important that the biological integrity of the duff (top layer) is preserved during storage. For example as stated in Appendix E of Appendix A7 (Ethnobotany Survey Report): "In order to mitigate for annual species, such as chia or golden suncup, one should either collect and store seed prior to the disturbance	PG&E agrees that proper management of topsoil is important. As discussed in response to comment #763a FMIT-192, salvage of topsoil during installation of linear utility features is a common practice for PG&E and will be done where the proposed excavation will occur in areas where undisturbed topsoil may be present. In such areas, the upper 4 inches of soil will be carefully removed and placed near the excavation. The remaining sub-soil will then be excavated and stored separately from the topsoil. Following the installation of the pipe and backfilling of the trench the topsoil will be replaced over the trench. Therefore, there will be no need for long-term storage of undisturbed topsoil.			Comment resolved pending review of the 90% design.	Comment resolved.	90% BOD Appendix E Specification Sections 31 10 00 (Removal and Segregation) and 31 23 23 (Fill and Backfill)

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			Clean soil that cannot be immediately used as backfill may be reused in other areas within the APE, or stockpiled for future reuse within the APE.	and to re- seed post-construction or salvage the topsoil (3-4 inches) where construction or disturbance will take place and store that soil until after construction. Topsoil salvaged from short-term disturbance areas should be piled to no more than 4 feet high and stabilized to prevent loss during storage. It should be re-spread during site rehabilitation as an initial procedure following construction. These measures will preserve a portion of the existing seed bank through construction. In short-term disturbance areas, the existing seed bank present in the topsoil has advantages over subsequently sown seed in that it is pre-conditioned to the soils environment.”	As for the rest of the excavated soils that are not undisturbed topsoil, as discussed in response to comment #763a FMIT-192, these desert soils in general are low in nutrients and organic matter and soils such as these that have been subject to disturbance typically lose a large percentage of the available nutrient supply and important soil biota. Therefore, PG&E does not propose to conduct any specific actions related to protecting biological integrity while these soils are being stored. Further detail will be provided in the 90% design.					
775	DOI-320	Section 2.5, Page 2-5	“The volume of displaced soil in and near Soil RFI/RI Areas from the decommission-ing and removal . . . “	Consideration should be given to storing soils from the IM-3 decommissioning and sampling activities in the local vicinity of IM-3.	Based on September 18 TWG discussion, areas in the local vicinity of IM-3 treatment plant were included in the updated Figure 7.6-1 and the Potential Soil Storage Location Evaluation Matrix (see **Attachment G**, at the end of this table).		DOI defers to PG&E and the FMIT regarding soil storage locations in this area.		Topics related to the draft soil matrices and updated map showing soil storage and construction staging areas (updated Figure 7.6-1) were discussed at various 60% RTCs TWG meetings. Updates to the matrices and map were made as a result of these discussions. The latest version is included in **Attachment G**, at the end of this table.	O&M Manual Volume 4 Sections 2.4 and 2.5, and Figure 2.4-1.
776a	FMIT-194	Sect 2.5p. 2-4 to 2-5	*Displaced soil that is non-hazardous but is unsuitable for final disposition onsite because contaminants are present above the interim screening level cannot be reused until project-specific soil cleanup goals are finalized and must be stored onsite.*	The current groundwater EIR does not specifically address long-term storage of soil within the APE. Please indicate how impacts to cultural and visual resources associated with long-term soil storage will be evaluated. While stakeholder input has been requested in regards to potential locations for soil storage it is not clear how the final decision will be made. This process needs to be transparent. Therefore please provide a matrix which includes all parameters used in the decision/rationale behind final storage locations that will be discussed with the Tribe. Parameters that should be transparently discussed in regards to the final soil storage location would include proximity to cultural resources, whether access routes are adjacent to cultural resources, distance of storage to point of origin and will potential locations have any visual	For the first part of this comment, please see response to comment #290 DTSC-115. PG&E agrees with and supports a process to identify and evaluate soil storage locations and construction staging areas for the groundwater remedy. To that end, PG&E has participated in discussions with Agencies and Tribes on this topic at various TWG meetings since March 2013. In response to comments from Tribes and DOI (see #288, #289, #775, #776a, and #776b) and through further discussions to resolve these comments, PG&E has modified Figure 7.6-1 to show current proposed locations for soil storage and construction staging areas, and drafted a strawman for two matrices – one for soil storage locations and one for construction staging areas (see **Attachment G**, at the end of this table).			The Tribes look forward to working with PG&E and federal agencies to complete the matrices prior to the 90% design. The Tribes look forward to seeing long term soil storage evaluated in DTSC’s future CEQA analysis. On March 6, 2014, the FMIT provided to DTSC and DOI a comment letter on proposed soil storage and staging areas. This letter is included in **Attachment G** at the end of this table.	Topics related to the draft soil matrices and updated map showing soil storage and construction staging areas (updated Figure 7.6-1) were discussed at various 60% RTCs TWG meetings. Updates to the matrices and map were made as a result of these discussions. The latest version is included in **Attachment G**, at the end of this table.	O&M Manual Volume 4 Sections 2.4 and 2.5, and Figure 2.4-1.

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				impacts that are not currently addressed in the GW EIR.						
776b	Hualapai-144 Chemehuevi-144 Cocopah-144 CRIT-144	Sect 2.5p. 2-4 to 2-5	*Displaced soil that is non-hazardous but is unsuitable for final disposition onsite because contaminants are present above the interim screening level cannot be reused until project-specific soil cleanup goals are finalized and must be stored onsite.*	The current groundwater EIR does not specifically address long-term storage of soil within the APE. Please indicate how impacts to Cultural and Visual resources associated with long-term soil storage will be evaluated within the groundwater EIR. While stakeholder input has been requested in regards to potential locations for soil storage it is not clear how the final decision will be made. This process needs to be transparent. Therefore please provide a matrix which includes all parameters used in the decision/ rationale behind final storage locations that will be discussed amongst all stakeholders. Parameters that should be transparently discussed in regards to the final soil storage location would include proximity to cultural resources, whether access routes are adjacent to cultural resources, and will potential locations have any visual impacts that are not currently addressed in the groundwater EIR.	For the first part of this comment, please see response to comment #290 DTSC-115. For the second part of this comment, please see response to comment #776a FMIT-194.			The Tribes look forward to working with PG&E and federal agencies to complete the matrices prior to the 90% design. The Tribes look forward to seeing long term soil storage evaluated in DTSC's future CEQA analysis. The Hualapai Tribe and the Cocopah Indian Tribe provided to DTSC and DOI comment letters on proposed soil storage and staging areas on March 10 and March 13, 2014, respectively. These letters are included in **Attachment G** at the end of this table.	Topics related to the draft soil matrices and updated map showing soil storage and construction staging areas (updated Figure 7.6-1) were discussed at various 60% RTCs TWG meetings. Updates to the matrices and map were made as a result of these discussions. The latest version is included in **Attachment G**, at the end of this table.	O&M Manual Volume 4 Sections 2.4 and 2.5, and Figure 2.4-1.
777	DOI-321	Table 2.4.1, Notes	"This table presents a reference list of analytes and associated screening levels that may be applicable for making decisions related to disposition of displaced site materials. The specific analytes and screening levels applicable for characterization of displaced materials will be determined based on the origin of the material and potential disposition locations."	For the 90% Design submission, will PG&E develop a table defining what type of analyses and screening levels will be applicable with the known origin locations?	The intent of this footnote was to clarify that characterization of the displaced soil would not include analysis of all analytes listed in the table, instead the analytical suites would be decided based on origin of the displaced material. A separate table is not necessary in the 90% Design. The type of analyses for displaced material within or near an RFI/RI area is listed in Tables 1.2-1 and Table 1.2-2 Analytical Suites columns. Displaced material outside RFI/RI sites and near roadways will be analyzed for PAHs and lead as described in response to comment #765 DOI-311. Table 2.4-1 lists the appropriate screening criteria for each analyte.		Comment resolved.		Comment resolved.	Not applicable

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778	DOI-322	Table 2.4-1	Notes: Background	The in-text citation is CH2M HILL, May 2009; however, the Reference section lists CH2M HILL 2009a, CH2M HILL 2009b, and CH2M HILL 2009c. A consistent format is required.	The letter “c” will be added after 2009.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Table 2.4-1.
779	DOI-323	Table 2.4-1	Notes: DTSC CHHSL	The in-text citation OEHHA, 2005 is not listed in the Reference section.	The following item will be listed in the Reference under OEHHA -- “California Environmental Protection Agency. 2005. *California Human Health Screening Levels (CHHSLs)*.”		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 7.
780	DOI-324	Table 2.4-1	Notes: EPA RSL	The in-text citation is CH2M HILL, 5/2011; however, the Reference section lists CH2M HILL 2011a, CH2M HILL 2011b, and CH2M HILL 2011c. A consistent format is required.	The letter “c” will be added after 2011.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Table 2.4-1.
781	DOI-325	Section 3.1.1, Page 3-1	General Comment	Does PG&E plan on stacking drums?	PG&E does not plan on stacking drums.		Comment resolved.		Comment resolved.	Not applicable
782	DOI-326	Section 3.1.1, Page 3-2	“If the contents are removed from the drums for offsite transportation and treatment or disposal, the drums will be reused only for compatible soil and waste streams.”	Will the drums be cleaned prior to reuse?	The subject bullet will be revised to state: “Drums containing hazardous waste will not be reused”		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 3.1.1.
783	DOI-327	Section 3.1.2, Page 3-2	“RCRA and non-RCRA Hazardous Soil. If it is necessary to temporarily stockpile soil classified as RCRA or non-RCRA hazardous waste . . . “	Further describe the situations necessitating stockpiling of RCRA and non-RCRA hazardous waste/soil rather than storing the material in roll-offs or drums. It is the agency’s preference to minimize stockpiling of RCRA and non-RCRA hazardous soil and material that exceeds screening criteria to the extent practicable. Further information should be provided on how wind and water erosion or infiltration will be addressed for hazardous waste/soil.	Stockpiling of soil RCRA and non-RCRA hazardous waste/soil is not planned. It is anticipated that all soil that is above soil screening levels will be placed in roll-off bins or similar containers. In the unlikely event that soil with contaminant concentrations above screening levels is stockpiled, best management practices described in Section 3.1.2 will be employed to prevent wind and water erosion.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 3.1.2.
784	DOI-328	Section 3.1.3, Page 3-3	“The bins will be covered and inspected at a specified frequency.”	Specify a proposed inspection frequency (as noted in Section 3.4).	Inspection frequencies are listed in Section 3.4. Weekly for containers storing hazardous waste, and monthly for containers storing non-hazardous waste. A reference to Section 3.4 will be added to the subject bullet.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 3.1.3

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785	DOI-329	Section 3.3, Page 3-3	General Comment	Can the labels be color-coded so that soil classification can be ascertained from a distance?	Standard California Hazardous Waste Labels will be used for containers storing hazardous waste so changing the color of this label is not possible. However, different color labels will be used to distinguish between "Non-Hazardous Clean Soil" and "Non-Hazardous Soil for Long-Term Storage".		Comment resolved.		Comment resolved	O&M Manual Volume 4 Section 3.3.2
786	DOI-330	Section 3.4, Page 3-4	"Any deficiencies observed during inspection will be corrected, and corrective measures will be documented."	Should a deficiency be observed, what will be the time frame for correcting the deficiency, and who will be responsible for correcting and documenting the deficiency and remedy?	Deficiencies observed during inspections will be corrected upon discovery. The employee inspecting the storage areas will be responsible for correcting and documenting the deficiency and implementing its remedy.		Comment resolved pending review of BMPs for soil storage.		Comment resolved.	O&M Manual Volume 4 Section 3.4
787	DOI-331	Section 3.5, Page 3-4	"In compliance with 22 CCR 66264.14 (California action-specific ARAR #76), a barrier, such as temporary fencing, will be provided for hazardous waste accumulation areas that are otherwise accessible to the general public."	Will security be provided in all areas that store hazardous wastes, or only in those areas that are accessible to the general public?	Security will be provided in all areas that store hazardous wastes.		Comment resolved.		Comment resolved.	Not applicable
788	DOI-332	Section 3.5, Page 3-5	"In addition to the project-specific HSP procedures, hazardous waste accumulation areas will be provided with fire extinguishers, decontamination equipment including an eye wash station, and an alarm system . . . "	Does PG&E anticipate any remote locations of hazardous waste accumulation areas, and, if so, will these areas also contain decontamination equipment, security fencing, an eye wash station, and an alarm system?	PG&E does not anticipate utilizing any remote locations for storage of hazardous waste. If hazardous waste is encountered, it will likely be stored at the Compressor Station and/or the Transwestern Bench. Any hazardous waste accumulation area will be equipped with the equipment noted in Section 3.5. - Security/ Emergency Response.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 3.1, 1st paragraph, last 2 sentences.

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789	DOI-333	Section 4.1, Page 4-1	"Waste management training, including OSHA 1910.120 HAZWOPER Annual 8-Hour Refresher."	Recommend adding more details regarding the type of training that will be provided. Please provide examples of the trainings specific to site activities that will be given.	The following text will replace the first bullet: "Hazardous waste management training that meets the requirements of 22 CCR 66265.16, that will address how to implement applicable provisions of the hazardous waste contingency plan and how to perform job duties related to hazardous waste management in a manner that complies with hazardous waste regulatory requirements. Each employer working at the site is responsible for providing this training to their employees. The specific content of this training will vary by employer and by job function."		Comment resolved.		Comment resolved.	OMM Volume 4 Section 4.1.
790	DOI-334	Section 4.3, Page 4-1	General Comment	Does PG&E plan on inspecting contracted waste disposal facilities?	PG&E's current policy is to inspect all potential contracted waste disposal facilities for compliance prior to negotiation and contracting.		Comment resolved.		Comment resolved.	Not applicable
791	DOI-335	Section 5, Page 5-1	"In addition, in accordance with the Management Protocol for Handling and Disposition of Displaced Site Material, PG&E will maintain a Displaced Material Inventory for all displaced soil, which will include: . . . "	How long will such records be maintained?	In compliance with Section XXV of the CD (DOI 2013), PG&E will maintain such records for 10 years following receipt of certification of completion. At the conclusion of the record retention period, PG&E will notify DOI and DTSC in writing at least 90 days prior to the destruction of any records and will provide DOI and DTSC with the opportunity to take possession of any records.		Comment resolved.		Comment resolved.	Not applicable
792	DOI-336	Section 7		The following items are present in the Section 7 Reference list, but are not referenced in the text: DTSC 1996, DTSC 2006, and DTSC 2011.	The listed items will be removed from Section 7 (References).		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 7
793	DOI-337	Section 7		The discrepancy between the different formats for the same citation, (CH2M HILL 2009c and CH2M HILL, May 2009), needs to be addressed, and a consistent format chosen.	The current convention is CH2M HILL 2009c. Citations will be reviewed and any with stray formatting will be corrected.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 7
794	DOI-338	Section 7		The discrepancy between the different formats for the same citation, (CH2M HILL 2011b and CH2M HILL 5/2011), needs to be addressed, and a consistent format chosen.	See response to comment #793 DOI-337.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 7

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795	DOI-339	Section 7		The discrepancy between the different formats for the same citation, (CH2M HILL 2011c and CH2M HILL 5/2011), needs to be addressed, and a consistent format chosen.	See response to comment #793 DOI-337.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 7
796	DOI-340	Appendix A, Section 1.0, Page A-1	"To document baseline soil conditions prior to groundwater remedy implementation, . . . "	The in-text citation to PG&E 2012 is not included in the Appendix A Reference list.	The information for PG&E 2012 is in the References section (Section 7 of Volume 4); it will also be added to the reference list in Appendix A of Volume 4.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Section 6.
797	DOI-341	Appendix A, Section 2.1, Page A-2	"If the pipelines/conduit alignments are in or near Soil RFI/RI Investigation Areas, a soil sample will be collected at 1 foot bgs and at the bottom of the trench to assess conditions for management of disturbed soil."	Provide specific information on the spacing between a Soil RFI/RI Investigation Area and an alignment required in order for an alignment to qualify under this sampling protocol.	The alignment would need to be within 25 feet of the RFI/RI Investigation area to qualify under this sampling protocol. The following is an example of how the text will modified throughout Volume 4: "If the pipelines/ conduit alignments are in or <u>within 25 feet of</u> Soil RFI/RI Investigation Areas, a soil sample will be collected at 1 foot bgs and at the bottom of the trench to assess conditions for management of disturbed soil."		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Addx A Section 2.1.
798	DOI-342	Appendix A, Section 2.1, Page A-2	"If the pipelines/conduit alignments are in or near Soil RFI/RI Investigation Areas, . . . "	To clarify that subject sampling will not always occur, begin this sentence with "Except as noted below". Also, refer to the SMP Section 2.2 general comment.	The text will be revised as suggested. Please see response to Comment #765 DOI-311.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Addx A Section 2.1.
799	DOI-343	Appendix A, Section 2.1, Page A-3	"Baseline soil samples will be analyzed for Title 22 metals and sodium."	Please provide the rationale for analyzing Title 22 metals.	Metals are generally a concern at Topock Compressor Station. The groundwater remedy is designed to address a chromium plume, and the agencies consider selenium and molybdenum of potential concern related to SWMU1/ AOC 1. In addition, transient by-products, which include arsenic, manganese, iron, and barium may exceed baseline and background concentrations during remedy implementation. Lead has been added to the baseline soil samples outside RFI/RI Investigation Areas and along roadways as described in		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Addx A Section 2.1.

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					response to Comment #765 DOI-311. Although some of these metals may not be present in influent and effluent at significant concentrations, obtaining baseline concentrations of all these metals in soil will allow PG&E to definitively assess potential affects to soil associated with the operation of the groundwater remedy. Therefore, the baseline soil samples will be analyzed for Title 22 metals because it includes all of the metals listed above, and is cheaper than analyzing for the individual metals. A summary of this rationale will be included in the 90% BOD.					
800	DOI-344	Appendix A, Section 2.2, Page A-4	"If the baseline soil sample location is within a Soil RFI/RI Investigation Area, the sample will also be analyzed . . . "	To clarify that subject sampling will not always occur, begin this sentence with "Except as noted below".	Text will be modified as suggested.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Addx A Section 2.2.
801	DOI-345	Appendix A, Section 2.3, Page A-4	"A number of new monitoring wells are proposed (at the 60% design stage) to be installed to support the groundwater remedy system."	Information in this section conflicts with the sample strategy presented in SMP Section 2.2 regarding drill cuttings. Furthermore, a sample at 1 foot bgs is not representative of the cuttings generated at depth. Please resolve.	The sampling strategies listed in Section 2.2 of the SMP and Section 2.3 of the Baseline SAP serve two different purposes. The sampling strategy listed in Section 2.2 of the SMP is to characterize drill cuttings from the installation of wells for reuse, storage, or offsite disposal of the soil. The sample strategy listed in Section 2.3 of the Baseline SAP is to assess baseline conditions in areas where the monitoring wells will be installed to allow PG&E to definitively assess potential affects (e.g., incidental spills during sampling) to soil from the monitoring well.		Comment resolved.		Comment resolved.	Not applicable
802	DOI-346	Appendix A, Section 4.2, Page A-5		The in-text citation for PG&E 2012 is not listed in the Appendix A Reference list.	See response to comment #796 DOI-340.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Section 6.
803	DOI-347	Appendix A, Section 4.2, Page A-5	"Drill cuttings include fragments of rock and soil that are removed to	Section 2.5 of the Soil Management Plan (SMP) notes that decisions regarding the acceptable mode and location of storage of non-hazardous soils above screening criteria will be evaluated once the volume of soil is	The text in Section 4.2 will be revised to be consistent with Section 2.5 of the SMP. The text will read as follows: "Cuttings and any soil from excavation areas that are below		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Addx A Section 4.2.

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			create the borehole."	determined during the baseline sampling or RFI/RI investigation. The last sentence of this section notes that it will be stockpiled. Stockpiling of non-hazardous soils above screening criteria has not been agreed to by the agencies. The text should be consistent with Section 2.5 of the SMP.	hazardous waste characteristic levels, but above interim screening levels, will be ~~stockpiled and~~ managed ~~onsite~~ following protocols prescribed in this Soil Management Plan. ~~until project-specific cleanup goals have been established.~~"					
804a	FMIT-196	APPEND A Sect. 4.2 p. A-5	*Water generated during equipment decontamination will be collected in bins or portable storage tanks temporarily located in staging areas near the drilling sites or at the Compressor Station as needed. Secondary containment will be set up at the drilling area for the portable storage tanks or bins. Rinsate will be processed at the IM No. 3 treatment plant, the new remedy-produced water conditioning plant, or transported to a PG&E contracted offsite disposal facility.*	It is our understanding that IM3 will be decommissioned during the early phases of the remediation. The IM3 location should not be considered as a possible site for rinsate processing. It is the Tribe's preference that IM3 facilities IM3 should not be included within the remediation design whenever possible.	PG&E does not intend to use the IM-3 treatment plant as part of the final remedy. Pursuant to the Settlement Agreement between the Tribe and DTSC, the IM-3 treatment plant will be decommissioned when DTSC determines that the final remedy is operating properly and successfully and has plume control, as long as DOI has concurred with DTSC's determination. PG&E understands the Tribe's preference, but until the time that the remedy is found to be operating properly and successfully and IM-3 is decommissioned, PG&E may need to use the IM-3 facilities and site to ensure timely functioning of the final remedy. See response to comment #857, FMIT-200.				PG&E's response was discussed with the FMIT, and revised in response to that discussion.	Not applicable
804b	Hualapai-145 Chemehuevi-145 Cocopah-145 CRIT-145	APPEND A Sect. 4.2 p. A-5	*Water generated during equipment decontamination will be collected in bins or portable*	It is our understanding that IM3 will be decommissioned during the early phases of the remediation and therefore do not believe that it should be considered as a possible site for rinsate processing. IM3 should not be included within the remediation design. However if it is	See response to comment #804a FMIT-196.					Not applicable

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			storage tanks temporarily located in staging areas near the drilling sites or at the Compressor Station as needed. Secondary containment will be set up at the drilling area for the portable storage tanks or bins. Rinsate will be processed at the IM No. 3 treatment plant, the new remedy-produced water conditioning plant, or transported to a PG&E contracted offsite disposal facility.	to be used then a discussion should include what will be done with rinsate once IM3 is removed.						
805	DOI-348	Appendix A, Section 5.1, Page A-6	"Data validation procedures will include: … ."	Who will be performing the data validation, and what training or certifications will they have?	PG&E's contract chemists and scientists will perform the validation. There are no official certificates for data validation. However, the team consists primarily of individuals with a minimum of 3 to 5 years of experience in an environmental laboratory as chemists and are then trained to perform validation by a senior chemist using the software, QAPP, and methods associated with the project. The validation uses a two tiered approach where the senior chemist performs a second level validation (review) on all data. This allows the senior chemist to continuously mentor the primary validation staff (chemist/ scientist).		Comment resolved.		Comment resolved.	Not applicable
806	DOI-349	Appendix A, Table A-1A		Information on the TCLP and the California WET tests appear to be missing from the table. Please add these tests.	TCLP and California WET Test information will be added to the table.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Table A-1A
807	DOI-350	Appendix A, Table A-1A	General Comment	Which glass containers will be clear and which amber colored?	The color (amber or clear) of the glass container will be added to Table A-1A.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Table A-1A

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808	DOI-351	Appendix A, Table A-2	Notes	The in-text citation for CH2M HILL, May 2009 it is not listed in the Reference section.	The information for CH2M HILL, May 2009 is in the References section (Section 7 of Volume 4); it will also be added to the reference list in Appendix A. Citation will also be updated.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Section 6
809	DOI-352	Appendix A, Table A-2	Notes	The in-text citation for OEHHA 2005 is not listed in the Reference section.	See response to comment #779 DOI-323.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Section 7 O&M Manual Volume 4 Apdx A Section 6
810	DOI-353	Appendix A, Attachment 1, Section SOP-B3	Borehole Sampling by Drilling – General Procedure	The in-text citation for ASTM 1984 is not listed in the Reference section.	The in-text citation for ASTM 1984 is not listed because the reference is spelled out completely in the text as American Society of Testing Materials (ASTM) D1586, "Standard Method for Penetration Test and Split-Barrel Sampling of Soils" (ASTM 1984) (see SOP-B3, page 3 of 8).		Comment resolved.		Comment resolved.	Not applicable
811	DOI-354	Appendix A, Attachment 1, SOP-B15	"This standard operating procedure (SOP) provides guidance . . . "	The in-text citation for CH2M HILL 2005 is not listed in the Reference section.	The following reference will be added to Section 6 of Appendix A (page A-6): "CH2M HILL. 2005. *Sampling, Analysis, and Field Procedures Manual, PG&E Topock Program*."		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Section 6
812	DOI-355	Appendix A, Attachment 1, SOP-B15	Soil Sampling Logs Documentation	The in-text citation for CH2M HILL 2005 is not listed in the Reference section.	See response to comment #811 DOI-354.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Section 6
813	DOI-356	Appendix A, Attachment 1, SOP-B15	" . . . covered in section 3.3 of the PG&E Program QAPP and in SOP-B5 . . . "	The in-text citation for CH2M HILL 2005 is not listed in the Reference section.	See response to comment #811 DOI-354.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Section 6
814	DOI-357	Appendix A, Attachment 1, SOP-B16	"This Standard Operating Procedure (SOP) describes the analysis of in situ and ex situ soil and debris . . . "	The in-text citation for CH2M HILL 2005 is not listed in the Reference section.	See response to comment #811 DOI-354.		Comment resolved.		Comment resolved.	O&M Manual Volume 4 Apdx A Section 6
815	DOI-358	Appendix A, Attachment 1, SOP-B16	Required Documents	The in-text citation for CH2M HILL 2012 is not listed in the Reference section.	The in-text citation for CH2M HILL 2012 is on the Reference list for Appendix A (see 3rd item).		Comment resolved.		Comment resolved.	Not applicable
Specific Comments – Appendix M – Freshwater Pre-injection Treatment System Design Basis Memorandum										
816	DOI-359		General Comment	The technical memorandum needs to address solid waste generation, storage, and disposal. Please revise the tables, figures, and text accordingly.	The 90% design will include arsenic-only pre-injection treatment as a contingency. The attached technical memorandum (included in **Attachment F**, at the end of this		Resolved pending review of technical memo provided.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.

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					table) will replace the existing technical memorandum in Appendix M in the 90% BOD.					
817	DTSC-242	Appendix M, 1.0 Introduction, Page 1	… arsenic removal to concentrations less than the federal and California maximum contaminant level (MCL) of 10 micrograms per liter (µg/L) and fluoride removal to concentrations less than the California MCL of 2 milligrams per liter (mg/L)….	Attaining a goal of 2 mg/L for fluoride is futile as higher concentrations already exist in the area where fresh water will be injected. Please revise here and throughout the memorandum. A realistic treatment goal should be sought for fluoride.	As discussed in response to comment #145 DTSC-50, water quality in the proposed injection area exhibits elevated levels of naturally occurring fluoride. Fluoride concentrations in both HNWR-1 and the exploratory borehole at Site B are similar that in the proposed injection area. Therefore, treatment to remove fluoride is not needed pursuant to California standards, and hence, setting a treatment goal for fluoride is not needed. See also response to comment #21 DTSC-2.	PG&E should develop a background value for fluoride at the injection locations so that the injection standard for fluoride can be appropriately set. See response to comment #21 DTSC-2.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
818	DTSC-243	Appendix M, Page 1	This information is based on ongoing studies and will be updated as additional bench-scale testing results become available, and as the detailed design/optimization efforts progress (target completion in summer 2013)	Please provide the update to agencies as soon as possible.	See attached technical memo for information on arsenic-only pre-injection treatment system (included in **Attachment F**, at the end of this table).	Comment resolution pending review of technical memo provided.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
819	DTSC-244	Appendix M, 2.0 Freshwater Water Quality, Treatment Goals and Design Flow Rates, Page 2		This section should discuss receiving water quality as it is related to treatment goals. Arsenic and fluoride background values specific for the injections areas are suggested. All data and calculations utilized in derivation of the background numbers should be provided.	See response to comment #21 DTSC-2.	Noted. See response to comment #21 DTSC-2.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
820	DTSC-245	Appendix M, 3.0 Evaluation and Selection of Treatment Technologies, Page 2		This section should discuss treatment technologies for arsenic only and allow them to be fully developed in following sections. As noted in section 5.6 of the memorandum, ferric hydroxide treatment would be	See attached technical memo for information on arsenic-only pre-injection treatment system (included in **Attachment F**, at the end of this table).	Comment resolution pending review of technical memo provided.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.

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				selected if fluoride treatment is not required.						
821	DOI-360	Section 4.0, Page 3	"A groundwater sample was collected from HNWR-1 well in early January 2013 and was shipped to ASL for bench-scale testing."	Provide more information on the sampling procedures. How much water was collected? What type of samples were collected – grab or from continuous water flow conditions?	A total of three 55-gallon drums was collected under continuous flow conditions.		Resolved.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
822	DOI-361	Section 4.0, Page 3		The in-text citation for CH2M HILL, 2009 is not listed in the Reference section.	Comment noted. This has been corrected in the attached technical memorandum.		Resolved.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
823	DTSC-246	Appendix M, 4.0 Summary of Ongoing Bench-scale Testing Results, Page 3	From a water quality perspective, the average concentration of arsenic and fluoride in the Topock Background Study was 12.3 µg/L and 3.8 mg/L, similar to that in HNWR-1 (CH2M HILL, 2009).	It is not understood why a comparison to regional background values are being made and, therefore, it is recommended that the cited sentence be deleted. It would seem more appropriate to cite the HNWR-1/Topock2-3 data because that is the water subject to testing and evaluation. The cited 12.3 average for regional arsenic appears to be in error. The mean and median regional background values for arsenic from the CH2M HILL 2009 Background Report (Table 2-13) are 5.9 and 5.5 ug/L respectively, and are not close to the 12.3 ug/L average cited. Average values were not summarized in the Background Report. The cited fluoride average of 3.8 mg/L also appears to be in error. Tables 2-10 and 2-12 of the Background Report indicate that the maximum mean and median fluoride concentrations are both 4.0 mg/L. Topock-2 well had the second highest fluoride concentration in the whole background well population. Based on the Background Report it would be more fair to say that HNWR-1 is mining some of the highest arsenic and fluoride bearing waters in the region. Please also recall that elevated water temperatures occur at the Topock-2 well area suggestive of hydrothermal activity.	"Topock Background Study" was cited in error in the reference text, the correct citation should be Topock-2 well. The cited average concentration of arsenic and fluoride are correct, and can be found in Tables 2-9 and 2-10, respectively, in the 2009 Background Study Report.	Please replace the cited text with the following: "From a water quality perspective, the average concentration of arsenic and fluoride in the Topock 2 well was 12.3 µg/L and 3.8 mg/L, similar to that in HNWR-1 (CH2M HILL, 2009). The Topock Background Study (CH2M HILL, 2009) indicates that these are some of the highest arsenic and fluoride concentrations in the region."			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.

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824	DTSC-247	Appendix M, 4.0 Summary of Ongoing Bench-scale Testing Results, Page 3	The groundwater sample was processed continuously through the column, and the treated water was sampled and analyzed for arsenic and fluoride until breakthrough (defined as at least 70 percent of the average influent concentration).	For completeness, please indicate what volume(s) were utilized during these tests.	See attached technical memo for information on arsenic-only pre-injection treatment system ((included in **Attachment F**, at the end of this table. See Section 4, 3rd paragraph of the tech memo).	Comment resolution pending review of technical memo provided.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
825	DOI-362	Section 5.1, Page 4	"Groundwater will be pumped and conveyed from the HNWR-1 well and the current TCS source wells (Topock-2 and -3) to the existing TCS storage tanks."	Since the groundwater is near neutral with a relatively high redox potential, the ongoing studies (see Introduction) should examine treatment effectiveness without pH adjustment and hypochlorite addition. If not required, removal of the treatment processes would reduce capital and operating costs.	Industry research and practice indicates the treatment process is most effective under oxidizing and slightly depressed pH conditions.		Comment resolved.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
826	DTSC-248	Appendix M, 4.0 Summary of Ongoing Bench-scale Testing Results, Wastewater Generation, Page 4	Assuming that regenerating a vessel after 1,500 bed-volumes will meet the treatment goals, the number of media regenerations per year is estimated to be 70 per in-service vessel at the maximum flow rate of 900 gpm and 35 per in-service vessel at the nominal flow rate of 450 gpm. Based on	The section should also comment on anticipated waste generation volumes if only arsenic is treated. With AA it would appear to be a quarter less than that for fluoride treatment. Since section 5.6 indicates ferric hydroxide would be selected for arsenic, its associated waste generation should be discussed.	See attached technical memo for information on arsenic-only pre-injection treatment system ((included in **Attachment F**, at the end of this table. See Section 5.4 of tech memo).	Comment resolution pending review of technical memo provided.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.

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			these frequencies, the range of wastewater generated could be in the millions to tens of millions of gallons per year; therefore, it is critical to optimize the process and system design to minimize the amount of wastewater generated.							
827	DTSC-249	Appendix M, Treatment Effectiveness and Time to Breakthrough, Page 4	Figure 1 (located at the end of this memo) shows concentrations of arsenic and fluoride in treated water versus the number of bed-volumes of groundwater passed through (one bed-volume is equivalent to the amount of adsorptive media in the column).	Figure 1 was not easy to quickly comprehend. Perhaps a legend could be applied to the figure that repeats what is stated in text for each run. Also, it is not certain if AA-FS50 is plotted. Conclusions regarding fluoride treatment effectiveness and waste generation issues will need to be revised after a more reasonable fluoride treatment goal is established. For example, a very different conclusion would be derived for a fluoride target goal of 4mg/L (see Figure 1 of the memorandum)	See response to comment #816 DOI-359. See response to comment #817 DTSC-252, PG&E does not believe that fluoride treatment is warranted.	Comment resolution pending review of technical memo provided. Also see response to comment #21 DTSC-2.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
828	FMIT-197 Hualapai-146 Chemehuevi-146 Cocopah-146 CRIT-146	Section 5.1 p. 4	Groundwater will be pumped and conveyed from the HNWR-1 well and the current TCS source wells (Topock-2 and -3) to the existing TCS storage tanks. Water will be pumped from these tanks and will be injected with hypochlorite	Will chlorine residual affect remedy performance and carbon dosing?	This depends on residual levels. PG&E is evaluating dechlorination steps to remove residual chlorine from the treated freshwater. Dechlorination is often accomplished by addition of 1) ascorbic acid, 2) calcium thiosulfate, or 3) hydrogen peroxide (chemical reactions are shown below). Ascorbic acid (vitamin C) and calcium thiosulfate work by breaking the hypochlorous acid into hydrochloric acid and water. Hydrogen peroxide works by breaking the hypochlorite ion to form chloride ion, water, and oxygen.			Comment resolved pending review of the 90% design.	Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.

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			for arsenic oxidation and with acid to reduce pH to 6 to 6.5		1) C5H5O5CH2OH + HOCl => C5H3O 5CH2OH + HCl + H2O 2) CaS2O3 + 4HOCl + H2O => CaSO4 + 4HCl + H2SO4 3) H2O2 + -OCl => Cl- + O2 + H2O The equipment would involve storage containers, drums, or totes, metering pumps, and an inline static mixer. The proposed FWPTS location has sufficient space for this equipment. Additional details will be provided as part of the 90% design submittal.					
829	DOI-363	Section 5.2, Page 5		Discuss the disposition of the wastewater streams as shown in Table 4 and Figure 2 either at the end of this section or in a new subsequent section. Also, see the comment regarding modifications to Table 4, including the need for a new column.	For the disposition of the wastewater streams, please see attached technical memorandum (included in **Attachment F**, at the end of this table), Section 5.2, Wastewater and Solid Waste Generation.		Comment resolved.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
830	DOI-364	Section 5.2, Page 5	"The testing is anticipated to be completed in summer 2013."	When will the ongoing bench-scale testing be completed?	The bench scale testing is complete, please see attached technical memo for a summary of testing results (included in **Attachment F**, at the end of this table).		Comment resolved.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
831	DTSC-250	Appendix M, 5.2 Media Regeneration Process, Page 6	Exhibit 3 & 4	Exhibits will need to be revised for revised fluoride treatment goals and prepared for arsenic only treatment.	See response to comment #817 DTSC-252, PG&E does not believe that fluoride treatment is warranted in this case. See attached technical memo for information on arsenic-only pre-injection treatment system (included in **Attachment F**, at the end of this table).	Comment resolution pending review of technical memo provided.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
832	DOI-365	Section 5.4, Page 6	"The system will be automated to reduce the need for continuous operator oversight."	Will alarms send electronic messages to on-site operators notifying them of system shutdown or troubles?	Yes.		Resolved.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
833	DOI-366	Section 5.4, Page 6	"Grab samples will be collected periodically and tested in the sample room . . . "	What testing procedures and equipment will be used to test for arsenic?	An SOP for arsenic testing will be developed and included in O&M Manual Volume 1, for submittal at 90% design.		Resolved pending review of the 90% design.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.

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834	DOI-367	Section 5.6, Page 7	"As previously mentioned, the FWPTS will be designed to achieve a safe, efficient, and sustainable operation . . . "	The text describing disposable granular ferric hydroxide as the treatment technology of choice for arsenic removal only should reference Appendix A, and Appendix A should provide the evaluation leading to this conclusion.	See attached technical memo for information on arsenic-only pre-injection treatment system (included in **Attachment F**, at the end of this table).		Resolved pending review of the 90% design.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
835	DTSC-251	Appendix M, 5.6 Design Philosophy/Uncertainties in Design, Page 7	For example, if fluoride treatment is not required, the treatment process would change to using disposable granular ferric hydroxide media (rather than regenerable AA), using the same treatment vessels described above. The resulting change would eliminate the need for the regeneration steps and regeneration-related equipment and chemicals. The building and outdoor tank area could be reduced in size.	Disposable ferric hydroxide treatment should be fully developed for the 90%/100%, even if only as a contingency. Figures similar to Figures 2 through 5 should be prepared for this treatment method within this memorandum.	Yes, as stated in response to comment #21 DTSC-2, PG&E will include a freshwater pre-injection treatment for arsenic only in the 90% and final designs as a contingency. Figures similar to Figures 2 through 4 were prepared and included in the attached memo (included in **Attachment F**, at the end of this table). Note that there was no Figure 5 in Appendix M in the 60% BOD.	Comment resolved.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
836	DOI-368	Section 7.0, Page 8	References	The following item is in the Reference list but is not referenced in the text: CH2M HILL 2013.	Comment noted. This has been corrected in the attached technical memorandum.		Comment resolved.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
837	DOI-369	Table 1		Because the text discussion focuses on arsenic and fluoride, all of the other data in the table can be deleted. Arsenic and fluoride data for Topock-2/-3 needs to be added, as it is a secondary source of water.	See Table 1 in the attached technical memo (included in **Attachment F**, at the end of this table).	As this may be the only current place where HNWR-1 data are presented, retention of the data is suggested.	Resolved pending review of the 90% design.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.

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838	DOI-370	Table 2		A goal of <1,000,000 gallons/year of wastewater is three to five times less than rates shown in Exhibit 3 and Table 4. Please explain the difference in values or correct if this is an error.	This value will be revised to reflect an arsenic-only pre-injection treatment system (see Table 2 in the attached technical memorandum, included in **Attachment F** at the end of this table).		Resolved pending review of the 90% design.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
839	DTSC-252	Appendix M	Table 2, Page Tables-7 Minimum Groundwater Injection Flow Capacity 75 gpm	Re. Freshwater treatment: Minimum flow rates are not discussed much in the 60% design. Briefly, what is the basis and how might the remedy utilize the lower flows. Won't it affect cleanup time? PG&E should provide analysis of startup injection rates, and propose parameters (decision tree) requiring increase or decrease in injection rate.	Please see Exhibit 3.3-4 of the 60% BOD for the basis of the design flow rate. The minimum flow for freshwater pre-injection treatment system was set to be same as the minimum freshwater injection flow from groundwater modeling (for details on basis of the modeled flow rates and ranges, see Section 3.3.3.4 of the BOD, as well as Appendix B). Information regarding the potential low flow range scenarios will be included in the 90% BOD. The cited 75gpm will be corrected to 150gpm (see Table 2 in the attached technical memorandum).	Comment resolved pending review of the 90% design.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
840	DOI-371	Table 4		The table is difficult to interpret. Recommend the following modifications: • The stream # should reference Figure 2 (Flowchart). • A heavy solid line should be inserted across the table between Wastewater Volume and Nominal Flow, highlighting the maximum flow conditions and nominal flow conditions values. • Include one more column (7d) to represent the flow to the IRZ/cooling towers, and the neutralization flow it receives, (if this is true). The final disposition of neutralization wastewater flow is not discussed in the text or identified in Exhibit 3 or Table 2, but is inferred in Figure 2 and Table 4. Please revise for clarity.	Please see Table 4 in the attached technical memorandum for an arsenic-only pre-injection treatment system (included in **Attachment F**, at the end of this table).		Comment resolved pending review of the technical memorandum.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
841	DOI-372	Figure 1		Data for AA-F550, Fluoride and Arsenic, are not displayed.	The horizontal axis scale was inadvertently reduced so the AA-FS50 results were not visible. As this figure pertains to As/F system, it will not remain in Appendix M of the 90% BOD and therefore it will not be revised.		Comment resolved.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.

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842	MWD-21	Figure-3	Arsenic and Fluoride Removal with Regenerated Activated Alumina	Per text, the anticipated amount of generated wastewater has not been estimated. 90% Design should provide further details — quantity and quality of wastewater, and disposal details. Figure 3 indicates that backwash water may be reused onsite at IRZ wells, Cooling Towers, or Existing Evaporation Ponds if not disposed off-site. Explain whether arsenic levels in wastewater would allow the water to be reused onsite.	See attached technical memo for information on arsenic-only pre-injection treatment system (included in **Attachment F**, at the end of this table).					See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
843	DOI-373	Appendix A, Page A-1	"As part of the pre-conceptual design work, several treatment technologies were identified and screened . . . "	The text in the introductory paragraph states that a more detailed screening was completed on five technologies. According to Section A.1.1, only two technologies are reviewed.	Text was revised in Appendix A of the attached technical memo (included in **Attachment F**, at the end of this table)		Comment resolved pending review of the technical memorandum.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
844	DTSC-253	Appendix M, Appendix A, Arsenic and Fluoride Treatment Technology Screening, A.1 Initial Screening, Page A-1	Iron-based Adsorbents Screened out, this process does not treat fluoride. **If arsenic-only treatment required, this process may be used.**	Highlight/discuss this issue in bold (iron treatment for arsenic-only) from the onset within this memorandum.	See attached technical memo for information on arsenic-only pre-injection treatment system (included in **Attachment F**, at the end of this table).	Comment resolution pending review of technical memo provided.			Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
845	DOI-374	Appendix A, Section A.2, Page A-4	"The four processes – regenerable AA and disposable AA – were advanced to bench-scale testing. "	The text references only two technologies, regenerable AA and disposable AA, and should be changed. Appendix M indicates two types of each technology were bench-scale tested, but this information is not included in Appendix A.	Text was revised to include four technologies in Appendix A of the attached technical memo. A total of four technologies were bench scale tested. Test results for regenerable and disposal AA were presented in Appendix M of the 60% BOD. Test results for GFH and coagulation are presented in the attached technical memorandum (included in **Attachment F**, at the end of this table), and will be included in the 90% BOD.		Comment resolved pending review of the technical memorandum.		Comment resolved.	See the *Addendum to the Freshwater Pre-injection Treatment System Conceptual Design Basis* included as Appendix M of the 90% BOD.
Specific Comments – Cover Letter										
846	Cocopah-147	Cover Letter		It is apparent from the 30% to the 60% designs that certain tribal preferences relating to tribal religious and cultural issues were not factored or substantively considered in engineering designs. At a minimum, equal scientific/ engineering rigor	Regarding the placement of facilities aboveground vs. belowground and alternative designs, please see PG&E's responses to comment #8b Hualapai-3/CRIT-3/ Chemehuevi-3/ Cocopah-3, #9 FMIT-4 /Hualapai-4/CRIT-4/ Chemehuevi-4/ Cocopah-					See RTC #1 DOI-1.

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				should be given to these legitimate alternate design constraints. For example, the Tribes expressed strong preferences for above-ground utility routings, however, the utility routings in the 60% BOD are almost exclusively routed below ground. Additionally, at one of the TWG meetings, PG&E provided a screening matrix for alternative routings in the East Ravine area. While this type of decision information is quite helpful in understanding the underlying decision rationale, it does not factor in tribal preferences.	4, and #1 DOI-1. As mentioned in prior responses, PG&E has and will continue to collaborate with Tribes and Agencies towards a satisfactory resolution of Tribal concerns, for inclusion in the 90% BOD.					
847	Cocopah-148	Cover Letter		Proposed monitoring well location "I" needs to be reevaluated in context of the new project EIR boundaries established in the summer of 2013. It is not clear that a well in this location will not have cultural, visual and spiritual impact and should only be placed after the latest round of archeological surveys have been incorporated into a updated EIR boundary. The placement of this well should be discussed with all stakeholders in light of the latest archeological surveys.	Please see response to comment #707a FMIT-182			Comment resolved.	Comment resolved.	See RTC #707a FMIT-182.
848	Cocopah-149	Cover Letter		The current groundwater EIR does not specifically address long-term storage of soil within the APE. Please indicate how impacts to Cultural and Visual resources associated with long-term soil storage will be evaluated within the groundwater EIR. While stakeholder input has been requested in regards to potential locations for soil storage it is not clear how the final decision will be made. This process needs to be transparent. Therefore please provide a matrix which includes all parameters used in the decision/rationale behind final storage locations that will be discussed amongst all stakeholders. Parameters that should be transparently discussed in regards to the final soil storage location would include proximity to cultural resources, whether access routes are adjacent to cultural resources, and will potential locations have any visual impacts that are not currently addressed in the groundwater EIR.	For the first part of this comment, please see response to comment #290 DTSC-115. For the second part of this comment, please see responses to comment #776b Hualapai-144/CRIT-144/ Chemehuevi-144/ Cocopah-144.					See RTC #290 DTSC-115. See RTC #776b Hualapai-144/ CRIT-144/ Chemehuevi-144/ Cocopah-144.

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849	CRIT-147	Cover Letter		To that end, CRIT is particularly concerned about two issues: first, the implications of recently located cultural resources on the ground surface, since, as of that time, those surface resources were unrecorded, and outside the apparent delimited preservation zones marked on Project resource protection maps. The import of this discovery is obvious, but nonetheless, disconcerting. It points to constant vigilance - by all concerned - as the only sure method of minimizing needless impacts to what is, for area Tribal members, a most sacred site.	The Tribe's comment and concerns are duly noted. As part of the project implementation, PG&E is committed to comply with all mitigation measures in the PA and CHPMP as well as in the certified EIR, which will result in the avoidance, minimization, or mitigation of potential impacts on cultural resources in the Area of Potential Effects and the project area, to the extent practicable. A number of the mitigation measures in the PA, CHPMP and EIR address discoveries of archaeological or historic resources. For example, a pre-project archaeological survey field verification will be conducted prior to any ground-disturbing activities (CHPMP, Stipulation 7.1.2). A Qualified Cultural Resources Consultant will be retained to observe ground-disturbing activities and will request the participation of tribal monitors during those activities, to ensure that historically significant resources are avoided to the maximum extent feasible (EIR CUL-1b/c-4). Further, all protocols in the future CIMP (EIR CUL-1a-8) will be followed during implementation to reduce the potential for impacts on historical resources within the project area, and to help preserve the values of and access to the Topock Cultural Area for local tribal users. Additionally, the CHPMP includes a Discovery Plan that provides procedures to be followed in the event that previously unidentified archaeological or historical resources are encountered during implementation of the Project. Also, consistent with current site practice, Agencies, Stakeholders, and Tribes will be invited to the site for a project initiation meeting to discuss various cultural sensitivities associated with the work activities.					90% BOD Section 6 Tables 6.1-1 through 6.2-3. Construction/Remedial Action Work Plan Sections 2 and 4.
850	CRIT-148	Cover Letter		Second, the uniform Tribal preference of placing as much piping and electrical conduit above ground, thereby avoiding both the extensive ground disturbance, and the need to	Regarding the placement of facilities aboveground vs. belowground, please see responses to comment #8b Hualapai-3/CRIT-3/Chemehuevi-3/Cocopah-3, #9 FMIT-4/Hualapai-4/					See RTCs #1 DOI-1, #8b Hualapai-3/CRIT-3/Chemehuevi-3/ Cocopah-3, and #9 FMIT-4/ Hualapai-4/ CRIT-4/Chemehuevi-4/Cocopah-4,

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				move and store masses of soil on-site or elsewhere is still an active area of concern for CRIT. While we understand the safety concerns of above-ground facilities, and the visual impacts that they will engender, it remains our strong preference to thousands of feet of deep, wide, destructive trenches in the Project area. CRIT has had recent, very disagreeable experience with excavations presumed to pose little or no risk to Tribal cultural resources. These excavations were undertaken by fully-qualified investigators with the best intentions, and employing the best available pre-screening methods, and still, the remains of CRIT's ancestors were crushed in the maw of heavy machines, their life's articles were smashed and tumbled, their jewelry shattered. We will work with DTSC, DOI, PG&E, and their consultants to keep this issue, this preference at the forefront of the design process.	CRIT-4/ Chemehuevi-4/ Cocopah-4, and #1 DOI-1. As mentioned in prior responses, PG&E has and will continue to collaborate with Tribes and Agencies towards a satisfactory resolution of Tribal concerns, for inclusion in the 90% BOD.					
851	Hualapai-147	Cover Letter		**<u>Consideration of Tribal Sensitivities as Design Criteria</u>** - While the Hualapai appreciates the opportunity for continued contribution towards a successful and effective remediation design, it is apparent from the 30% to the 60% designs that the expressed tribal preferences relating to Tribal religious and cultural issues were not substantively factored or considered in engineering designs. The Hualapai requests, at a minimum, equal scientific/engineering rigor should be given to legitimate alternate design constraints. During discussions with PG&E consultants, it is clear that various alternative design options proposed by the Tribes and intended to contribute to the 60% design process were dismissed without an unbiased quantitative comparative analysis. The Hualapai continue to believe however, that some of these discarded options may be substantially preferable to the design shown in the 60% BOD report. Therefore, in future discussions regarding design alternatives the	Regarding consideration of design alternatives, please see PG&E's response to comment #8b Hualapai-3/CRIT-3/Chemehuevi-3/Cocopah-3, #9 FMIT-4/Hualapai-4/CRIT-4/ Chemehuevi-4/ Cocopah-4, and #1 DOI-1. As mentioned in prior responses, PG&E has and will continue to collaborate with Tribes and Agencies towards a satisfactory resolution of Tribal concerns, for inclusion in the 90% BOD.			The Hualapai Tribe appreciates being involved in all stages of the Topock project and look forward to continuing our relationship with all the agencies and stakeholders involved in the project.	This comment and response were discussed at the December 17-18, 2013 TWG meeting.	See RTCs #8b Hualapai-3/CRIT-3/Chemehuevi-3/Cocopah-3, #9 FMIT-4/Hualapai-4/CRIT-4/ Chemehuevi-4/ Cocopah-4, and #1 DOI-1.

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				Hualapai and any interested Tribes involved with the Topock Remedial Project, would like to be provided with a detailed quantitative decision matrix that provides transparency into how and why final design options have been selected.						
852	Hualapai-148	Cover Letter		**Consideration of Alternative Design Options** – The Tribes, who have been living on and caring for this land for thousands of years, desire that their cultural values and input be equally weighted in the remedial design to those of PG&E and the remediation contractors who are merely temporary visitors to the Sacred landscape. This is of particular importance to Hualapai, who perceive portions of the remediation effort as an additional desecration to the land. Therefore, there is a strong desire on the part of the Hualapai, that special emphasis be focused on the avoidance and minimization of subsurface impacts at this area. Of particular importance is that sacred ground has existed here for hundreds of years, and should be protected for future generations. Specifically the planned installation of nearly 5 miles of large infrastructure trenches and vaults is a hugely disturbing and invasive construction. Subsurface disturbances permanently change the natural order of the land and require disruptive removal of these utilities once the remedy is complete. Invasive subsurface disturbances need to be avoided to the extent practicable. The Hualapai on numerous occasions have voiced their preference for the short-term visual impacts associated with aboveground pipework over the currently proposed permanent impacts associated with belowground trenching. The attached comments which include alternative designs to some sections of the infrastructure alignments provide a reasonable approach to lessening this impact. These alternative designs should be given full and fair consideration toward the goal of reducing the impacts to this area.	Regarding the placement of facilities aboveground vs. belowground, please see PG&E's responses to comment #8b Hualapai-3/CRIT-3/Chemehuevi-3/Cocopah-3, #9 FMIT-4/Hualapai-4/CRIT-4/ Chemehuevi-4/ Cocopah-4, and #1 DOI-1. As mentioned in prior responses, PG&E has and will continue to collaborate with Tribes and Agencies towards a satisfactory resolution of Tribal concerns, for inclusion in the 90% BOD.			The Hualapai Tribe appreciates being involved in all stages of the Topock project and look forward to continuing our relationship with all the agencies and stakeholders involved in the project.	This comment and response were discussed at the December 17-18, 2013 TWG meeting.	See RTC #8b Hualapai-3/CRIT-3/Chemehuevi-3/Cocopah-3, #9 FMIT-4/Hualapai-4/CRIT-4/ Chemehuevi-4/ Cocopah-4, and #1 DOI-1.

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853	Hualapai-149	Cover Letter		**Consideration for Placement of Staging and Displaced Soils Storage Areas** – The location of displaced soil storage and equipment staging areas is of particular concern, as these locations will inevitably see increased construction vehicle and truck traffic, dust and excessive noise. Therefore, the Hualapai's opinion is that storage and staging areas be located as much as possible away from, and out of sight of all Topock Maze areas. The Hualapai appreciates the ongoing discussions and efforts by all parties to address this issue, and support the continued effort to identify suitable locations for these activities which will address Tribal concerns.	The Tribe's comment is duly noted. PG&E appreciates the Tribe's participation and inputs on identifying and evaluation of suitable locations for soil storage and construction staging areas. PG&E hopes that current open discussions and transparent processes will yield a satisfactory solution that allows the project to move forward expeditiously.			The Hualapai Tribe appreciates being involved in all stages of the Topock project and look forward to continuing our relationship with all the agencies and stakeholders involved in the project.	This comment and response were discussed at the December 17-18, 2013 TWG meeting.	Construction/Remedial Action Work Plan, Figures 4-3 (Locations of Construction Facilities in Moabi Regional Park) and 4-5 (Construction Site Plan and Access Routes).
854	Hualapai-150	Cover Letter		**Consideration for Notification of Chemical Usage** – Chemicals that are foreign to the natural environment and are dissipated into the Sacred landscape are a significant concern to the Hualapai. Therefore, it is requested that full transparency into the specific types of chemicals used within the remediation project be provided prior to the construction and operation of the system. In addition, chemical usage volumes and frequencies should be provided to the stakeholders for review and comment.	See response to comment #13b Hualapai/CRIT/Chemehuevi/Cocopah -8.				Comment resolved.	O&M Manual Main Text, Exhibit L2.2-1 (Communication Framework During O&M).
855	FMIT-198	Cover Letter		**Incorporating Tribal Sensitivities as Design Criteria** - It is apparent that the expressed tribal preferences relating to tribal religious and cultural issues have not been factored or substantively considered in engineering design changes from the 30% to the 60% designs. For example, in its comments on the 30% BOD report, the Tribe expressed a preference for minimizing subsurface pipeline routings. Instead, the intermediate design calls for nearly all the water piping and utilities to be buried without any consideration of the Tribe's reasoning supporting its preference for above-ground alternatives. At a minimum, equal scientific/engineering rigor should be given to these legitimate alternate design constraints in the 90% BOD. Also, PG&E should provide the agencies a choice on how to proceed in balancing different criteria.	Regarding the placement of facilities aboveground vs. belowground and alternative design, please see responses to comment #8a FMIT-3, #9 FMIT-4/Hualapai-4/ CRIT-4/Chemehuevi-4/ Cocopah-4, and #1 DOI-1. As mentioned in prior responses, PG&E has and will continue to collaborate with Tribes and Agencies towards a satisfactory resolution of Tribal concerns, for inclusion in the 90% BOD.			The FMIT appreciates being involved in all stages of the Topock project and look forward to continuing our relationship with all the agencies and stakeholders involved in the project. The FMIT would like to see specifics of how the design achieves the goals of the tribe prior to the 90% design submittal.	This comment and response were discussed at the December 17-18, 2013 TWG meeting.	See RTCs #8a FMIT-3, #9 FMIT-4/Hualapai-4/ CRIT-4/Chemehuevi-4/ Cocopah-4, and #1 DOI-1.

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856	FMIT-199	Cover Letter		**Avoidance and Minimization of Infrastructure and Project Disturbances** - The Tribe expects that all above- and below-ground disturbances of any duration (short-, mid- and long-term) will be avoided and minimized to the extent feasible. Subsurface infrastructure not only permanently changes the natural order of the land but to respect tribal views, also generally require removal of these utilities once the remedy is complete, which causes additional disruptions. Intrusive subsurface disturbances therefore need to be avoided from the outset to the maximum extent feasible. Installation of remedial infrastructure on the ground surface itself also needs to be minimized in terms of its footprint. As discussed above, the Tribes have previously provided input on their preferences for installation methods that minimize subsurface disturbances throughout the remedies' lifecycles.	Regarding the placement of facilities aboveground vs. belowground, please see responses to comment #8a FMIT-3, #9 FMIT-4/Hualapai-4/CRIT-4/ Chemehuevi-4/ Cocopah-4, and #1 DOI-1. As mentioned in prior responses, PG&E has and will continue to collaborate with Tribes and Agencies towards a satisfactory resolution of Tribal concerns, for inclusion in the 90% BOD.			The FMIT appreciates being involved in all stages of the Topock project and look forward to continuing our relationship with all the agencies and stakeholders involved in the project. The FMIT would like to see specifics of how the design achieves the goals of the tribe prior to the 90% design submittal.	This comment and response were discussed at the December 17-18, 2013 TWG meeting.	See RTCs #8a FMIT-3, #9 FMIT-4/ Hualapai-4/CRIT-4/Chemehuevi-4/ Cocopah-4, and #1 DOI-1.
857	FMIT-200	Cover Letter		**Coordination of Removal of IM-3 with Final Remedy Implementation** - Project documents, including the FEIR, show that concurrent operation of Interim Measure No. 3 (IM-3) and the final groundwater remedy is incompatible. Operation of the IM-3 treatment plant will terminate upon start-up of the final remedy. Pursuant to the December 19, 2012, Settlement Agreement between DTSC and the Tribe ("Tribe/DTSC Agreement") the IM-3 *treatment plant,* will remain in place no longer than a determination that the final remedy is "operating properly and successfully" (OPS). The start-up strategy for the final remedy needs to be efficient, to ensure the earliest possible demonstration that the remedy is "operating properly and successfully" (OPS) so that the IM-3 plant can be decommissioned in a manner consistent with the settlement agreement between the Tribe and PG&E. Immediate restoration of the IM-3 parking/staging area and timely removal and restoration of the IM-3 treatment plant area are of critical importance to the Tribe due to the extreme cultural sensitivity of this	The Tribe correctly states that pursuant to the 2012 Settlement Agreement, the IM-3 treatment facility will be decommissioned when DTSC, with DOI's concurrence, finds that the final remedy is "operating properly and successfully." PG&E intends to abide by the terms of the 2012 Settlement Agreement. The start-up strategy for the final remedy will occur as efficiently as possible, subject to field conditions and the requirements of the agencies that have jurisdiction over this project. PG&E has concluded after consideration that it cannot remove pipelines and wells associated with the IM-3 treatment plant until the final remedy is operating properly and successfully. Wells, pipelines, and other components that are part of the IM-3 system and outside the treatment plant area, if removed, would prevent IM-3 from operating. IM-3's primary purpose is to provide hydraulic gradient control. The four IM-3 wells are used to maintain the gradient. Two extraction wells operate continuously and one injection well is in service with the other in standby mode to allow the extraction wells to continue pumping				This comment and the response were discussed by PG&E and the FMIT.	IM-3 Decommissioning, Removal, and Restoration Work Plan

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				particular area. In addition, apart from removal of the treatment plant, removal of such items as pipelines and wells that are associated with IM-3 should be considered in conjunction with the implementation of the final groundwater remedy to avoid additional disruption of the land surface and to economies during construction.	and maintain the gradient. The piping and electrical conduit connecting the injection and extraction wells are needed to convey water to the treatment system or from the treatment system for re-injection. The extracted groundwater cannot be re-injected without treatment and therefore all of these IM-3 components must be retained. See response to comment FMIT-44, which addresses restoration of the IM-3 treatment plan area, including parking and staging areas.					
858	FMIT-201	Cover Letter		<u>Avoidance or Minimal Use of FMIT Property</u> - The above issues regarding the minimization of infrastructure and project disturbance as well as addressing Tribal sensitivities in design apply in particular to the parcel owned in fee by the FMIT due to the extreme cultural sensitivity of the area. In addition, except to the extent DTSC expressly requires the use of the parcel owned by FMIT for specific purposes, FMIT consent will be required for such uses, consistent with the 2006 settlement agreement with PG&E and the PG&E easement recorded on the property. All planning and design should attempt to avoid and minimize existing and new infrastructure including utility lines, piping, staging or parking areas, storage areas, wells of all types, etc. All future remedy activities should also avoid this property to the maximum extent feasible, consistent with the 2006 settlement agreement between the Tribe and PG&E.	The terms of the 2006 Settlement Agreement and Easement Agreement between PG&E and the FMIT allow for PG&E to "install, access, use, operate, maintain, modify, upgrade and remove any and all additional Remediation-related Facilities required by the DTSC or another agency or governmental body with jurisdiction over the Property or the Remediation, including but not limited to additional treatment equipment, pipelines, extraction wells, injection wells, slurry walls, and in-situ facilities," on the IM-3 Property. Easement Agreement, § 3. The Settlement Agreement also acknowledges that the IM-3 Property may continue to be used for the groundwater remedy - "The Parties recognize that as part of the operation of the IM-3 or the final remedy, construction of additional facilities, such as additional wells, may be required and that this work may require the temporary use of heavy construction equipment, lighting facilities and associated activity." 2006 Settlement Agreement, § VI(B)(2)(a). PG&E agrees that it has an obligation to consult the FMIT on the location of remediation facilities on the IM-3 Property and to honor Tribal concerns to the maximum extent practicable and believes in its design of the groundwater remedy it has fulfilled and is fulfilling the requirements of the 2006 Settlement Agreement. If the FMIT has concerns				This comment and the response were discussed by PG&E and the FMIT.	90% BOD Executive Summary Section ES.3 (see Remedy proposed on FMIT Parcel).

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					about the location of specific infrastructure PG&E would be happy to discuss those concerns further with the FMIT, as it has done in the past.					
859	FMIT-202	Cover Letter		<u>**Compliance with Mitigation Measures and ARARs -**</u>Proper and full accounting of all mitigation measures and ARARs applicable to Native American, cultural, native flora, and wildlife values must be assured and independently verified by the lead agencies. Periodic reviews and specific reporting of compliance with each mitigation measure should be implemented. The agencies also must provide a transparent process for proposed revisions to existing mitigation measures or proposed application of mitigation measures from one project phase to another.	In compliance with the mitigation measures set forth in the certified EIR, PG&E has and will continue to prepare and submit to DTSC quarterly compliance reports (the first report was published in fourth quarter of 2011). In addition, PG&E has and will continue to submit to DOI documentation of compliance activities with specific ARARs in the design documents and progress reports. PG&E defers to the Agencies on request for process for proposed revisions to existing mitigation measures or proposed application of mitigation measures from one project phase to another.	PG&E is required to provide periodic reporting of the mitigation measures compliance to the agencies. Those compliance reports are considered public document. In response to inquiry on revision to mitigation measures, DTSC cannot substantively change or modify mitigation measures adopted as part of the certified EIR without formal CEQA process, which includes analysis and notifications. Mitigation measures are design to apply to the entire project unless the compliance period is specified.	In accordance with Section 9.4 of the CHPMP, BLM may amend the finalized CHPMP as additional information is developed regarding cultural and historic resources within the APE, in the event that the APE is revised, and for any other reason deemed appropriate by BLM. Revision of the CHPMP shall not require an amendment of the PA. The CHPMP may be revised in phases as the Undertaking progresses as identified in PA Stipulation VII.F.	Okay with DOI's response.	Comment resolved.	90% BOD Section 6, Tables 6.1-1 through 6.2-3.
860	FMIT-203	Cover Letter		<u>**Establishing an Adequate Review Process through the 90% BOD Report -**</u> The recent review experience of the 60% BOD report indicates that the currently scheduled comment period for the 90% design review may not be of sufficient length to allow for complete and meaningful review and comment by the Tribes. The BOD reports are extremely large with many detailed appendices that need review, not only by the Tribe, but its consultants. In addition, at each stage of the design review process, sections have been introduced that have not been previously seen by the reviewers. DTSC and other agencies must allow sufficient time for the Tribes to consult with 1) the Tribes' technical internal consultants; 2) the TRC; 3) Tribal elders and leadership; and 4) other Tribes. The Tribes also need sufficient time to exercise their rights to government-to-government consultations with the agencies in regard to project impacts, an aspect which our Tribe does not want to see curtailed due to arbitrary schedule demands. One resolution might be the provision of interim review between the agencies and Tribes of how Tribal issues and comments will be incorporated into the design prior to submittal of the 90% BOD report.	Please see response to comment #11a FMIT-6.			The FMIT appreciates being involved in all stages of the Topock project and look forward to continuing our relationship with all the agencies and stakeholders involved in the project. The FMIT would like to see specifics of how the design achieves the goals of the tribe prior to the 90% design submittal.	This comment and response were discussed at the December 17-18, 2013 TWG meeting.	CIMP CUL-1a-8d (Protocol for The Review of Project Design Documents)

TABLE I-1
Response to Comments on Basis of Design Report/Intermediate (60%) Design
Groundwater Remedy Basis of Design Report/Pre-Final (90%) Design
PG&E Topock Compressor Station, Needles, California

Item	Comment Number	Section/ Page	Reference Text	60% Design Comment	PG&E Response to 60% Design Comments	DTSC Response to 60% Design Comments	DOI Response to 60% Design Comments	Tribe Response to 60% Design Comments	Final Comment Resolution	Where responses are reflected in the 90% design documents?
861	FMIT-204	Cover Letter		**Consideration of Alternative Designs -** During various discussions with PG&E and its consultants at the 11/VG, CWG, and other meetings, it is evident that PG&E consultants evaluated internally and then discarded certain options during the 60% design process. These options were disregarded without any proactive discussion or consultation with the Tribes before being set aside. The Tribes are concerned that some of these discarded options may be substantially preferable to the designs presented in the 60% BOD report and provide greater compliance with ARARs. Resolution of the utility of design alternatives might include PG&E consultants/ engineers engaging the Tribes in more detailed discussions with regarding alternative options for such features as transformer configuration, use of potential overhead and/or aboveground utility conveyances, etc., prior to release of the 90 % BOD report. The 90% BOD report should also include a brief summary of design alternatives considered but rejected with an explanation of why they were rejected. Where there are options that might better meet the Tribe's concerns, such options should also be summarized for the agencies in the BOD report.	Regarding alternative designs, Please see responses to comment #8a FMIT-3 and #1 DOI-1. PG&E has and will continue to collaborate with Tribes and Agencies towards a satisfactory resolution of Tribal concerns, for inclusion in the 90% BOD.			The FMIT appreciates being involved in all stages of the Topock project and look forward to continuing our relationship with all the agencies and stakeholders involved in the project. The FMIT would like to see specifics of how the design achieves the goals of the tribe prior to the 90% design submittal.	This comment and response were discussed at the December 17-18, 2013 TWG meeting.	See RTCs #8a FMIT-3 and #1 DOI-1.
862	FMIT-205	Cover Letter		**Avoidance of All Sensitive Areas** - The current "project boundary" limits, as depicted in various project maps, have been shown to be incomplete and/or inconsistent with sensitive areas that should be avoided. This conflict needs to be resolved such that all sensitive areas are excluded from any project activity prior to completion of the 90% BOD report. Recent surveys performed by various Tribal, BLM,PG&E, and DTSC representatives need to be properly accounted for in mapping project boundaries and exclusion areas.	Please see response to comment #12 FMIT-7/Hualapai-7/CRIT-7/ Chemehuevi-7/ Cocopah-7.			The FMIT appreciates being involved in all stages of the Topock project and look forward to continuing our relationship with all the agencies and stakeholders involved in the project. The FMIT would like to see specifics of how the design achieves the goals of the tribe prior to the 90% design submittal.	Ongoing discussion between Tribes and Agencies. This is an open item that will be carried forward.	90% BOD Section 6 Tables 6.1-1 through 6.2-3.
863	FMIT-206	Cover Letter		**Minimization of Chemical Usage** - Chemicals that are foreign to the natural environment are a concern to the Tribe. Additionally, some chemicals may be more offensive for use in a sacred area than others. PG&E should fully disclose the types, volumes, and frequencies of chemical usage associated with the project. The Tribe should be notified of any proposed	See response to comment #13a FMIT-8.			See comment #13a FMIT-8.	Comment resolved.	O&M Manual Main Text Exhibit 2.2-1 (Communications Framework during O&M).

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Item	Comment Number	Section/ Page	Reference Text	60% Design Comment	PG&E Response to 60% Design Comments	DTSC Response to 60% Design Comments	DOI Response to 60% Design Comments	Tribe Response to 60% Design Comments	Final Comment Resolution	Where responses are reflected in the 90% design documents?
				changes in the types or significant quantities of chemicals used.						
864	Chemehuevi-147	Cover Letter		In reviewing the 60% BOD document, it was apparent that tribal preferences relating to spiritual and cultural matters were not factored into the proposed design. Alternate routings and design specifics which do address tribal preferences are discussed and presented within the attached comments. At a minimum, equal consideration and fair evaluation should be given to these legitimate and alternative designs. Any design screening evaluation criteria should also specifically consider and include tribal preferences.	Regarding alternative designs, please see responses to comment #8b Hualapai-3/CRIT-3/ Chemehuevi-3/Cocopah-3 and #1 DOI-1.					
865	Chemehuevi-148	Cover Letter		To the extent possible, invasive subsurface disturbances should be avoided, as these are permanent injuries to the natural order of the land. Installation of remedial structures in the subsurface should be minimized both in total volume of earth disturbed, and in the total foot print of the construction.	Regarding the placement of facilities aboveground vs. belowground, please see responses to comment #8b Hualapai-3/CRIT-3/ Chemehuevi-3/ Cocopah-3 and #9 FMIT-4/Hualapai-4/ CRIT-4/Chemehuevi-4/Cocopah-4.					
866	Chemehuevi-149	Cover Letter		The current "project boundary" as indicated in the 60% BOD figures has been shown to not adequately represent the actual culturally sensitive areas. Significant time and effort on the part of the Tribes, DTSC and others has been expended to address this problem and any final documents prepared should reflect that all sensitive areas be excluded from any project activity. This conflict needs to be address and resolved prior to the issuance of the 90%. In addition, the plume boundaries as depicted should reflect the current plume configuration.	Please see response to comment #12 FMIT-7/Hualapai-7/CRIT-7/ Chemehuevi-7/Cocopah-7. An updated Cr(VI) plume boundary will be included in the 90% BOD.				.	
867	Chemehuevi-150	Cover Letter		During construction activities for the remedy installation, due care should be taken, and preparation made for unforeseen encounter with contaminated soils during the significant excavation activities and disturbances. The Tribe is concerned that sufficient contingencies are in place to contain and minimize any additional impacts related to discovery of existing contamination,	The Tribe's comment is duly noted. The Soil Management Plan (Volume 4 of the O&M Manual) addresses the management and handling of potential contaminated soils that may be encountered during remedy construction/O&M activities. Close coordination with the upcoming Soil RFI/RI sampling effort will continue to ensure that the Soil Management Plan reflects the most current					

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				and any potential release of chemicals or materials utilized during the construction phase.	information on known contaminated soils at the site. In addition, the forthcoming Construction/ Remedial Action Work Plan will include sampling and monitoring as well as contingencies during construction. This Work Plan will be submitted with the 90% design for agencies, Tribes, and stakeholders review and inputs.					
868	Chemehuevi-151	Cover Letter		Chemicals that will be utilized during the operation of the remedy are by definition foreign to the natural environment. The use of chemicals should be minimized, and any chemicals utilized should be fully disclosed with regard to the type, volume, storage and frequency of use.	See response to comment #13b Hualapai/CRIT/Chemehuevi/Cocopah-8.				Comment resolved.	

Attachment A: RTC #1

Pipeline Evaluation Matrix, Visual Simulations, TRC's Response, and Tribes' Letters/Email

TABLE 1

Alternative Pipeline A/H & B Configuration Summary Description

Groundwater Remedy Project

PG&E Topock Compressor Station, Needles, California

Alternative Number	Name	Total Piping Length[a], feet	Underground Piping Length[a], feet	Aboveground Piping Length[a], feet	Bridges (Length, feet)	Power Poles	Radio Towers	Conceptual Layout[c]
0	Pipelines A/H Current Design	4,800	4,600	200	1 (180 feet)	0	0	Figure 1
0a	Pipelines A/H Current Route Above Ground[d]	4,800	830	3,970	3 (180 feet; and 2-30 foot pipe bridges (grade separations))	26	3	Figure 2
1	Pipelines A/H Alternative Route 1[d]	4,300	830	3,470	4 (140-feet; 1-50-foot, and 2-30 foot pipe bridges (grade separations))	26	3	Figure 3
2	Pipelines A/H Alternative Route 2[d]	4,000	650	3,350	5 (280-feet, 330-feet, and 3-30 foot pipe bridge (grade separation))	26	3	Figure 4
B0	Pipeline B - Current Design[b]	2,500	1,900	600	0	0	0	Figure 21
B0a	Pipeline B Alternative 1 (Current Route Aboveground)[b]	2,500	0	2,500	1-30 foot pipe bridge (grade separation))	0	0	Figure 21

Notes:

a. Lengths rounded to nearest 100 feet and represent length of corridor which may consist of 1 or more pipes and conduit.

b. Electrical cable is underground for this alternative and extends for about 1,600 feet.

c. Figures included with visual simulations.

d. Approximately 360 feet of underground conduit is included for this alternative to enable safe access to wells and equipment.

Pipeline A - Segment 1

Evaluation Factors	Evaluation Criteria	Basis for Evaluation[3]	Comments/Notes
Construction Impacts	N, L, I, H[2]	Analysis	**H - Construction impacts are rated high because:** a) This piping alignment is on a steep slope (up to 2:1), which contains loose surface soils. Access is difficult and is less safe than the 60% design alignment. Further, drainage will be required to protect piping/electrical conduits. b) There is an existing, underground 30-inch SoCal gas pipe on the steep slope. Approximately 30-75 ft south of the gas pipe is the BNSF property line, and 25-60 ft north of the gas pipe is a culturally sensitive area as described by Tribes. Taking into account the SoCal Gas ROW (50-ft), the available work space on the south side of the ROW is only 5 ft at the pinch point and up to 50 ft at the widest spread. Construction on a steep slope will require adequate set back/work zone for not only the trench, but also staging of construction equipment staging, benching, etc. Since encroachment into the BNSF RR property is not viable, the south side is eliminated from further consideration. On the north side, the available work space is 0 ft at the pinch point, and up to 35 ft at the widest spread. Cutting into the undisturbed or culturally sensitive area to the north is required for adequate work space. c) New piping/conduits and associated work zone will be conducted outside of the 50-ft SoCal ROW, unless agreed to otherwise by SoCal Gas and allowed otherwise by BLM. d) To allow for future maintainability of the pipes, underground vaults will be required at the bottom and top of slope. Approximate vault dimension is 12-ft long x 6-ft wide. The estimated cost for this segment alone is $300,000.
Ecological Impacts[6]	N, L, I, H[2]	Analysis	**L - Ecological impacts are rated low because:** Segment 1 primarily runs underground with the majority of the route in previously disturbed open creosote bush scrub community, No impacts to desert tortoise are anticipated. Pipeline route is not within potential SWFL and other migratory bird habitat. Several mature plants would likely be removed during construction; such removal of large vascular plants to accomodate the pipeline would pose special problems for transplantation (due to large size and deep roots) or replacement planting (due to the difficulty of establishing native woody plantings in arid environments).
Displaced soil volume (or exacavated soil volume)	cubic yds	Calculation	Cutting into the undisturbed area to the north is required to create adequate work space. The estimated volume of displaced soil is 1,585 cubic yards (cy), excavated soil is 1,745 cy, of which, 300 cy is inside the area outlined as culturally sensitive area by the Tribes.
Worker Safety Impacts (Construction)	N, L, I, H[2]	Analysis	**H - Worker Safety Impacts during construction are rated high because:** a) Limited work space and work on steep slope increase safety risk. b) Construction near high natural gas pipeline increase risk.
Worker Safety Impacts (Operational)	N, L, I, H[2]	Analysis	**I - Worker Safety Impacts during operation are rated Intermediate because:** a) For O&M, there is an increased risk of incidents while working on slope, and while lifting or working in vaults. b) Working in vaults could involve confined space entry.
EIR Impacts	N, L, I, H[2]	(Legal) Opinion	**I - Additional CEQA review will be needed to evaluate the potential impacts of the new route.** The type of additional CEQA review required depends whether the design has new, significant impacts that were not disclosed in the EIR. If there are new, significant impacts, a supplemental EIR would be required; an addendum would not suffice. Further analysis will allow the technical team to determine whether this alternative may have new, significant impacts; one of the primary areas to be evaluated in this respect is the increased earthwork and ongoing maintenance.
Historical/Archaeological Impacts[4, 5]	N, L, I, H[2]	Analysis	**None - Historical/Archaeological impacts are rated none** because: All archaeological and historical sites are avoided.
Likelihood of Failure to Detect or Contain Leaks	N, L, I, H[2]	Analysis	**L - Likelihood of failure to detect or contain leaks is rated low** because of the vault at the bottom of the slope.
O&M Impacts	N, L, I, H[2]	Analysis	**I** - Majority of the maintenance activities will include O&M of erosion control measures (e.g., fix slope to reduce erosion) and cleaning of the vaults. Maintenance of the underground pipes is anticipated to be infrequent. The estimated annuall cost of this maintenance is $10,000.
Public Safety Impacts	N, L, I, H[2]	Analysis	**L** - If required, bollards will be installed to protect the vault at the bottom of the steep slope. The bollards could create safety hazard for motorists travel on NTH.
Ground Disturbance	Lineal Feet	Estimation	Length of pipe on the steep slope is approximately 310 linear feet. Approximately 125 feet traverse an area designated as possibly having cultural significance by the Tribes.

NOTES

[1] Segment description noted below

Segment 1 - Below ground water pipe and electrical conduit in larger casings going west from NTH parallel to SoCal gas pipeline to top of hill. See Figures 22 and 25.

[2] Ratings: N = “None”; L = “Low”; I = “Intermediate”; and H = “High.” These are qualitative ratings based upon the rationale provided and not to be used in a quantitative manner, i.e., the ratings are not additive.

[3] Indicate whether the basis for evaluation is an opinion, calculation, analysis, etc.

[4] Alternatives for Pipeline A & H do not extend into the floodplain for the purposes of this evaluation factor.

[5] PG&E assumes impacts on the Traditional Cultural Property within the APE determined by BLM to be eligible for the National Register of Historic Places will be analyzed under “Cultural Integrity”

[6] Alternatives for Pipeline A & H do not extend into the floodplain for the purposes of this evaluation factor.

Pipeline A - Segment 2

Evaluation Factors	Evaluation Criteria	Basis for Evaluation[3]	Comments/Notes
Construction Impacts	N, L, I, H[2]	Analysis	**I - Construction impacts are rated intermediate because:** a) Constraints along this segment include narrow road sections, cultural resources, mature vegetation, and access roads for BNSF and SoCal Gas. In addition, the City of Needles power poles intersect with this segment as shown in Figure 22. Therefore, the aboveground portions of this alignment would be located off the road. Aboveground pipe rack and guard rail would require 8-ft of clear space for O&M and access. b) New electrical and communication cables would be installed on new poles installed on the abandoned Route 66 to avoid the City of Needles poles. Another reason for this routing is that the poles would run along an existing access new road; placement of power poles elswhere would likely require construction of new access roads (see Figure 22).
Ecological Impacts[6]	N, L, I, H[2]	Analysis	**I - Ecological impacts are rated intermediate because:** Segment 2 runs both above and underground with one bridge structure proposed over Bat Cave Wash. Portions of the route are established in previously disturbed road and open creosote bush scrub community; however, the pipeline alignment goes through approximately 3.45 acres of the blue Palo Verde community. No impacts to desert tortoise are anticipated. Pipeline route is not within potential SWFL and other migratory bird habitat. While this alignment appears to mostly follow along the edge of a previously disturbed roadway, the first above ground segment (southernmost portion approximately 200 feet) appears to pass through a area with large vascular plants (that were not specifically mapped as palo verde or mesquite). Any removal of blue palo verde (a culturally important plant) or any other large vascular plants to accomodate the above-ground pipeline would pose special problems for transplantation (due to large size and deep roots) or replacement planting (due to the difficulty of establishing native woody plantings in arid environments). In addition, the above ground segment runs separately from an above ground power line, which could represent a separate but small additional potential impact for bird strikes.
Displaced soil volume (or exacavated soil volume)	cubic yds	Material take-off	The estimated volume of displaced soil and excavated soil is 210 and 930 cubic yards, respectively.
Worker Safety Impacts (Construction)	N, L, I, H[2]	Analysis	**H - Worker Safety Impacts during construction are rated high because:** a) Limited work space and work on steep slope increase safety risk. b) Construction near high natural gas pipeline increase risk.
Worker Safety Impacts (Operational)	N, L, I, H[2]	Analysis	**L - Worker Safety Impacts during operation are rated low because:** a) For O&M, there is an increased risk of incidents while working on aboveground pipe off the access road and while working in vaults near the pipe bridge. b) Working in vaults could involve confined space entry.
EIR Impacts	N, L, I, H[2]	(Legal) Opinion	**H - Additional CEQA review will be needed because the EIR did not contemplate aspects of this design, including aboveground piping infrastructure, aboveground utility poles, and a potential variance to the Fire Code.** The type of additional CEQA review required depends whether the design has new, significant impacts that were not disclosed in the EIR. Such impacts could include new aesthetic impacts from aboveground utilities and pipelines or new impacts from additional earthwork or possible fire code violations. If there are new, significant impacts, a supplemental EIR would be required; an addendum would not suffice. Further analysis will allow the technical team to determine whether this alternative may have new, significant impacts. For example, if the technical team determines that the location of the poles near Loci B would have new significant aesthetic impacts or new significant impacts on cultural resources, and those impacts cannot be mitigated to a less than significant level, then a supplemental EIR would be required. Following the same pipeline route as the design contemplated in the EIR helps from a CEQA perspective. Tribes and agencies may be concerned, however, about the impact of locating new, above-ground infrastructure so close to Maze Loci B.
Historical/Archaeological Impacts[4, 5]	N, L, I, H[2]	Analysis	**None - Historical/Archaeological impacts are rated none** because: All archaeological and historical sites are avoided.
Likelihood of Failure to Detect or Contain Leaks	N, L, I, H[2]	Analysis	**L - Likelihood of failure to detect or contain leaks is rated low.** All secondary containment piping accessible for visual inspection, but water carrier pipes not accessible. Low point sumps equipped with level switches will be primary means of monitoring for and containing leaks. See also O&M Impacts caused by use of double-contained steel pipe.
O&M Impacts	N, L, I, H[2]	Analysis	**H - O&M Impacts rated high**. O&M impacts are higher than 60% design in large part due to the use of steel pipe through most of the route. Mortar lined steel pipe will resist corrosion, but the lining has a shorter life than underground plastic piping. In addition, the liner will not be suitable for pipe cleaning using strong chemicals or aggressive mechanical methods. In addition, minerals in the groundwater may precipitate on the liner or biological materials may to adhere to the liner reducing pipe capacity. Aboveground pipe supports and steel pipe increase difficulty of maintenance of piping requiring more equipment and personnel. in addition, the aboveground structures will require sand blasting and painting every 10 years. Other maintenance activities will include cleaning of the vaults and maintenance of the underground pipes is anticipated to be infrequent.
Public Safety Impacts	N, L, I, H[2]	Analysis	**I - Public Safety Impacts are rated intermediate.** Aboveground structures increase risk of public safety incidents due to potential vehicle impacts on IM-3 access road and Route 66 west of IM-3. Greater impact given the inherent vulnerability of aboveground piping (members of the public have been known to shoot pipes) and large rocks or other debris that may strike the pipe during a storm event.
Ground Disturbance	Lineal Feet	Material take-off	339

NOTES

[1] Segment description noted below

Segment 2 - Underground across IM-3 access road and run above-ground water pipe on pipe supports along 60% design route to Bat Cave Wash pipe bridge. Electrical power and fiber optic run on new poles from top of hill near SoCal gas pipeline along abandoned Route 66 to Bat Cave Wash. See Figures 22.

[2] Ratings: N = "None"; L = "Low"; I = "Intermediate"; and H = "High." These are qualitative ratings based upon the rationale provided and not to be used in a quantitative manner, i.e., the ratings

[3] Indicate whether the basis for evaluation is an opinion, calculation, analysis, etc.

[4] Alternatives for Pipeline A & H do not extend into the floodplain for the purposes of this evaluation factor.

[5] PG&E assumes impacts on the Traditional Cultural Property within the APE determined by BLM to be eligible for the National Register of Historic Places will be analyzed under "Cultural Integrity"

[6] Alternatives for Pipeline A & H do not extend into the floodplain for the purposes of this evaluation factor.

Evaluation Factors	Description of Baseline (Pre-Construction) Conditions
Cultural Integrity	
Visual Impacts	Baseline views/vistas of the natural landscape include Needles Rock, Topock Maze Loci A, B & C, Chemehuevi Mountains, Colorado River, BLM ACEC and the Havasu National Wildlife Refuge. Baseline views also include manmade features including I-40, BNSF Railroad, the pipeline bridge, Topock Marina, Park Moabi, the Topock Compressor Station and IM-3.
Ecological Impacts	The dominant plant communities at the site consist of creosote bush scrub (generally west of National Trails Highway) and salt cedar (generally between National Trails Highway and the Colorado River and at the mouth of Bat Cave Wash). The habitat in and around the Topock site is suitable for bighorn sheep, bobcats, chuckwallas, red-tailed hawks and other mammals, reptiles, and birds. Observations of mountain lion activity have been reported in this area as well. The Topock area provides foraging and/or nesting habitat for a variety of special-status bird species. Desert tortoise may have historically used the project area, but no evidence of current use has been documented during the protocol-level surveys conducted yearly since 2004.
Noise Impacts	See Final EIR[5] Section 4.9.1.5 for baseline conditions.
Worker Safety Impacts	Under baseline conditions, no work is occurring.
Schedule Impacts	Under baseline conditions, there are no delays to the project.
EIR Impacts	Final EIR for the Topock Compressor Station Groundwater Remediation Project, January 2011 [5].
Historical/Archaeological Impacts	Under baseline conditions, no additional impacts to historical/archeological resources occur for the groundwater project.
Likelihood of Failure to Detect or Contain Leaks	Under baseline conditions, no leaks occur.
Public Safety Impacts	Under baseline conditions, there is no increase impact to public safety due to the project.
Decommissioning Impacts	Under baseline conditions, no system is built therefore there are no decommissioning impacts.
Ground Disturbance	Under baseline conditions, no additional ground disturbance occurs based on the Aerial Map of Disturbed Areas, November 2011 (Appendix A-2 60% Design BOD)
Displaced soil volume	Under baseline conditions, no soil is displaced.
Capital Cost	0
O&M Cost	0
Decommissioning Costs	0
Construction Impacts [14]	Under baseline conditions, no project.
Fire Department Impacts [14]	Under baseline conditions, no project.
O&M Impacts [14]	Under baseline conditions, no project.

	Evaluation Criteria	**Pipelines A/H Current Design**	**Basis for Evaluation[3]**	**Comments/Notes**	**Pipelines A/H Current Route Above Ground**	**Basis for Evaluation[3]**	**Comments/Notes**
Evaluation Factors							
Cultural Integrity	Present/Not Present[6]						
Visual Impacts	N, L, I, H[2]	L	Simulations of views of Alternative 0 based on design drawings as seen from FEIR Key Viewpoints 6 and 9		H	Simulations of views of Alternative 0a based on design drawings as seen from FEIR Key Viewpoints 6 and 9 and two new viewpoints established on elevated areas providing foreground to middleground views of the proposed changes.	Installation of radio tower near compressor station will have little to no impact. From most views, impacts of new wood pole utility lines, above-ground pipelines on low racks, and grade separation structures will have an intermediate level of impact. Bridge crossing structures will have high levels of impacts in both foreground and middleground views. Other project elements will have high levels of impact in foreground views..
Ecological Impacts [11]	N, L, I, H[2]	I	Analysis	The current route primarily runs underground with one bridge structure proposed over Bat Cave Wash. The majority of the route is established in previously disturbed road and open creosote bush scrub community; however, the pipeline alignment goes through approximately 3.45 acres of the blue Palo Verde community and may result in the loss of individual Palo Verde. No impacts to desert tortoise are anticipated. Pipeline route is not within potential SWFL and other migratory bird habitat.	I	Analysis	This alternative route primarily runs aboveground with one bridge structure proposed over Bat Cave Wash. The majority of the route is established in previously disturbed road and open creosote scrub community; however, the pipeline alignment goes through approximately 3.45 acres of the blue Palo Verde community and may result in the loss of individual Palo Verde. No impacts to desert tortoise are anticipated. Pipeline route is not within potential SWFL and other migratory bird habitat.
Noise Impacts (construction)	N, L, I, H[2]	L	65 days (see Note 7 below for equipment list)	Construction noise impacts are created by the number of equipment and duration of construction.	I	85 days (see Notes 7 and 8 below for equipment list)	Construction noise impacts are created by the number of equipment and duration of construction.
Noise Impacts (operational)	N, L, I, H[2]	L	Analysis	Operational noise impacts: The majority of pumps and motors will be located either underground, inside a well, or inside an enclosure (e.g., building). Placing pumps and motors in these locations effectively minimizes the sound emissions. The remaining non-emergency above ground equipment is limited to transformers which are similar in size to the one already operating at IM-3, and communication/control panels.	I	Analysis	Operational noise impacts: The majority of pumps and motors or other equipment will be located either underground, inside a well, or inside an enclosure (e.g., building). Placing equipment in these locations effectively minimizes the sound emissions. The remaining non-emergency above ground equipment is limited to transformers which are similar in size to the one already operating at IM-3, and communication/control panels. Additional noise will be created by wind whistling by and impacting with aboveground structures.

Construction Impacts	N, L, I, H[2]	L	Analysis	Natural gas pipe crossings - 3 crossings will follow normal utility owner procedures to gain approval of crossings (see Worker Safety Impacts).	I	Analysis	Natural gas pipe crossings - 2 crossings will be made using with underground pipes. This would follow normal utility owner procedures to gain approval of crossings (see Worker Safety Impacts). One crossing of Southwest Gas (4") east of Bat Cave Wash on IM-3 access road will be made using aboveground structures. This type of crossing may not be allowed by Southwest Gas (4") resulting in potential design changes and delays. Adding aboveground structures (pipe supports and guard rails) will result several narrow sections of primarily Route 66 west of IM-3 and also at a few points along the IM-3 access road. This can be mitigated by extending the piping into undisturbed areas off the road if there is space available. Using power poles to carry electrical and communications will result in some additional disturbance to enable access to well vaults and other equipment. Safety considerations during design may require greater separation between aboveground structures and poles, resulting in even more disturbance.
Fire Department Impacts	N, L, I, H[2]	L	Analysis	Reducing the available width of Route 66 and IM-3 may result in violations of the San Bernardino County Fire Code for vehicle road access. The Code (Section 503.1 Article III states that roads must be 26 feet in width. Variances may be needed to obtain a permit as long as there are sufficient turnouts located every 600 feet. The existing access roads would likely serve that purpose.	H	Analysis	Reducing the available width of Route 66 and IM-3 may result in violations of the San Bernardino County Fire Code for vehicle road access. The Code (Section 503.1 Article III) states that roads must have 14 feet 6 inches vertical clearance and 26 feet in width. The low pipe racks and other pipe bridges considered for this alternative may need to be changed to taller structures or to an elevated continuous structure to meet the vertical space requirements. Variances for narrow roads are allowed if there are sufficient turnouts (every 600 feet), however these aboveground structures may prevent the minimum width (not specified in the Code, but designated by the Fire Department). The result of seeking this variance may cause additional disturbance to re-locate the pipe supports off the road. Due to the rough terrain and numerous gullies, this may also require additional support structures.
Worker Safety Impacts (Construction)	N, L, I, H[2]	I	Analysis	Underground construction is in general more hazardous than working aboveground. The route follows existing roads enabling relatively easy access and safe working conditions. Increased risk for 180 foot long pipe bridge involving scaffolding and lifting equipment and route to IRL-4 along a steep narrow road. -Natural gas (Southwest (4") and SoCal Gas (34")) pipe crossings south of IRL-3 along pipeline H and Southwest Gas (4") east of Bat Cave Wash on IM-3 access road present safety hazards.	I	Analysis	Aboveground construction is in general less hazardous than working underground. The route follows existing access roads enabling access and safe working conditions except as noted. -Increased risk for 180 foot long pipe bridge and 2-30 foot pipe bridges (grade separation) requiring scaffolding and lifting equipment and route to IRL-4 along a steep narrow road. -Addition of the aboveground pipe on steel support structures, would require the addition of guard rails to protect the pipe from incidental contact. This would reduce the width of the IM-3 access road and Route 66 west of IM-3 in several locations (see also Construction Impacts) resulting in additional safety hazards. -Natural gas (Southwest (4") and SoCal Gas (34")) pipe crossings south of IRL-3 along pipeline H and Southwest Gas (4") east of Bat Cave Wash on IM-3 access road present safety hazards.
Worker Safety Impacts (Operational)	N, L, I, H[2]	L	Analysis	For O&M, underground equipment enables ground-level access to system components, but increases risk of incidents while lifting or working in vaults. Personnel working inside secondary containment vaults (4 for this alternative) would require a confined space entry.	H	Analysis	For O&M, routing electrical overhead puts power lines closer to well vaults, which increases risk of inadvertent contact or static discharge during well maintenance. Guard rails and aboveground piping structures limit access to equipment increasing risk of incidents during maintenance or for O&M personnel vehicle accidents. Personnel working inside secondary containment vaults (9 for this alternative) would require a confined space entry.
Worker Safety Impacts (Decommissioning)	N, L, I, H[2]	L	Analysis	During decommissioning, removal of aboveground structures increase safety hazard (see Decommissioning Impacts below), but as most of the alternative is installed underground, the safety hazard is much lower.	I	Analysis	During decommissioning, removal of aboveground structures increase safety hazard (see Decommissioning Impacts below).
Schedule Impacts [15]	N, L, I, H[2]	65 days	Taken from 60% design schedule	Construction only as the alternative is described here.	85 days	Scaled based on material take-off and compared to 60% design schedule	Construction only as the alternative is described here. Additional EIR review or re-design caused by others would increase overall project schedule. A supplemental EIR review could extend the schedule 1 to 2 years.
EIR Impacts	N, L, I, H[2]	L	Opinion	The current design reflects the assumptions in the EIR. Although project refinement may necessitate further CEQA analysis, the analysis likely will be within the scope of what can be covered in an EIR addendum.	I	Opinion	Additional CEQA review will be needed. The type of additional CEQA review required depends whether the design has new, significant impacts that were not disclosed in the EIR. If there are new, significant impacts, a supplemental EIR would be required and an addendum would not suffice. Further analysis will allow the technical team to determine whether this alternative may have new, significant impacts. Following the same route as the design contemplated in the EIR helps from a CEQA perspective to the extent that the impacts caused by disturbance along this route have been analyzed by the existing EIR. Whether this option causes increased aesthetic impacts will need to be evaluated; if such impacts can be mitigated to a less than significant level, then an addendum could be prepared. If not, a supplemental EIR would be required. A supplemental EIR would result in a delay of approximately 12 to 24 months. The County Fire Code allows for variances from certain requirements. If a variance cannot be obtained, this could result in Fire Code violations and this would be is a new impact that has not been evaluated. If this impact can be mitigated to a less than significant level, an addendum can be prepared. If this impact cannot be mitigated and a variance is required, DTSC could interpret the need for a variance as a new impact triggering the need for a subsequent EIR.

Historical/Archaeological Impacts [12, 13]	N, L, I, H[2]	L	Analysis	Available site location information utilized along with draft Geoarchaeological report. Approx. 30% of route will impact Route 66. All other sites avoided.	L	Analysis	Available site location information utilized along with draft Geoarchaeological report. Approx. 30% of route will impact Route 66. All other sites avoided.
Likelihood of Failure to Detect or Contain Leaks	N, L, I, H[2]	L	Analysis	Almost all piping is underground elminating access to secondarily contained piping. Subject piping[10] is double contained with low point sumps equipped with level switches to detect a release. The majority of piping is plastic which has excellent corrosion resistance resulting in reduced risk of leaks. Underground installation prevents incidental contact further reducing chance of leaks.	I	Analysis	All secondary containment piping accessible for visual inspection, but water carrier pipes not accessible. Low point sumps equipped with level switches will be primary means of monitoring for and containing leaks. See also O&M Impacts caused by use of double-contained steel pipe.
O&M Impacts	N, L, I, H[2]	L	Analysis	O&M impacts are minimal due to use of plastic piping (HDPE) materials for majority of route. Plastic resists corrosion greatly limiting chance of leaks and has excellent record for long-term performance. Underground construction limits access to piping and electrical conduit for most of the line with the exception of the pipe bridge and the concrete trench section (approximately 1,000 feet).	I	Analysis	O&M impacts are higher than the current design in large part due to the use of steel pipe through most of the route. Mortar lined steel pipe will resist corrosion, but the lining has a shorter life than underground plastic piping. In addition, the liner will not be suitable for pipe cleaning using strong chemicals or aggressive mechanical methods. In addition, minerals in the groundwater may precipitate on the liner or biological materials may to adhere to the liner reducing pipe capacity. Aboveground pipe supports and steel pipe increase difficulty of maintenance of piping requiring more equipment and personnel. in addition, the aboveground structures will require sand blasting and painting every 10 years. This alternative is based on the City of Needles supplying power for the remedy facilities. Needles currently supplies the IM No. 3 plant and due to several factors is subject to numerous outages, particularly during the summer monsoon season. In the absence of a backup generator installed in the area, there would be many shutdowns every year. Using radio as a transmission method for control and communications is less reliable than a cable or wired connection. This would affect either control of injection wells or logging of flows into or out of the wells. Results of this include service interruptions for well backwashing and reducing the accuracy of water accounting from the Colorado River basin. Currently multiple companies (PG&E, BNSF, Southwest Gas, SoCal Gas, City of Needles) use the IM No. 3 access road and Route 66 west of IM No. 3. These roads already function as a one-way road (as mentioned by Curt at Jan 23 TWG) when heavy/wide equipment (8 foot wide semi trailers carrying frac tanks requires approximately 21 feet working room for turns).This would primarily affect annual well rehabilitations for the 5 injection wells in the area and any major maintenance activity. Therefore, PG&E cannot reduce the width of the access road.
Public Safety Impacts	N, L, I, H[2]	N	Analysis	Almost no public safety impact due to nearly all piping and electrical installed underground.	H	Analysis	Aboveground structures increase risk of public safety incidents due to potential vehicle impacts on IM-3 access road and Route 66 west of IM-3. Greater impact given the inherent vulnerability of aboveground piping (members of the public have been known to shoot pipes) and large rocks or other debris that may strike the pipe during a storm event.
Decommissioning Impacts	N, L, I, H[2]	L	Analysis	Remove aboveground structures, vaults, equipment, and 1 pipe bridge (180 feet). Abandon in place underground piping and conduit. The removal of belowground infrastructure/piping as an alternative to current proposal to abandon in place would result in soil excavation and disturbance along entire length of Pipelines A and H (approximately 3,800 feet).	I	Analysis	Remove power poles, pipe supports, and other aboveground equipment. (26 power poles and 180 pipe supports. 3630 lf of guard rail @ 6' spacing ~600 supports, 1 pipe bridge (180 feet)) The removal of belowground infrastructure/piping as an alternative to current proposal to abandon in place would result in soil excavation and disturbance along portions of piping and electrical conduit west of Bat Cave Wash to FW-1 and IRL-4. This would occur over a distance of approximately 800 feet.
Ground Disturbance	Lineal Feet	209	Material take-off		209	Material take-off	Not updated for change to underground for approximately 800 feet.
Displaced soil volume	cubic yds	1,869	Material take-off		736	Material take-off	Not updated for change to underground for approximately 800 feet.
Capital Cost	$	$4,900,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs	$7,600,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs
O&M Cost	$ (30 year PV, 7% interest)	$410,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs	$1,700,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs
Decommissioning Costs	$	$350,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs	$1,900,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs

	Evaluation Criteria	Pipelines A/H Alternative Route 1	Basis for Evaluation[3]	Comments/Notes	Pipelines A/H Alternative Route 2	Basis for Evaluation[3]	Comments/Notes
Evaluation Factors							
Cultural Integrity	Present/Not Present[6]						
Visual Impacts	N, L, I, H[2]	H	Simulations of views of Alternative 1 based on design drawings as seen from FEIR Key Viewpoints 6 and 9 and two new viewpoints established on elevated areas providing foreground to middleground views of the proposed changes	Installation of radio tower near compressor station will have little to no impact. From most views, impacts of new wood pole utility lines, above-ground pipelines on low racks, and grade separation structures will have an intermediate level of impact. From views in which project elements are visible in the foreground impacts will be high.	H	Simulations of views of Alternative 2 based on design drawings as seen from FEIR Key Viewpoints 6 and 9 and two new viewpoints established on elevated areas providing foreground to middleground views of the proposed changes	Installation of radio tower near compressor station will have little to no impact. From most views, impacts of new wood pole utility lines, above-ground pipelines on low racks, and grade separation structures will have an intermediate level of impact. Bridge crossing structures will have high levels of impacts in both foreground and middleground views. Other project elements will have high levels of impact in foreground views..
Ecological Impacts[11]	N, L, I, H[2]	I	Analysis	This alternative route primarily runs aboveground with one bridge structure proposed over Bat Cave Wash. The majority of the route is established in previously disturbed road and open creosote scrub community. The pipeline alignment goes through approximately 3.55 acres of the blue Palo Verde community and may result in the loss of individual Palo Verde. A larger disturbance area within creosote bush scrub habitat will be required for this alignment due to the section of pipeline ascending a steep slope near National Trails Highway. No impacts to desert tortoise are anticipated. Pipeline route is not within potential SWFL and other migratory bird habitat.	I	Analysis	This alternative route primarily runs aboveground with two bridge structures proposed over Bat Cave Wash. The majority of the route is established in previously disturbed road and open creosote scrub community. The pipeline alignment goes through approximately 2.55 acres of the blue Palo Verde community and may result in the loss of individual Palo Verde. No impacts to desert tortoise are anticipated. Pipeline route is not within potential SWFL and other migratory bird habitat.
Noise Impacts (construction)	N, L, I, H[2]	I	65 days (see Notes 7 and 8 below for equipment list)	Construction noise impacts are created by the number of equipment and duration of construction.	I	75 days (see Notes 7 and 8 below for equipment list)	Construction noise impacts are created by the number of equipment and duration of construction.
Noise Impacts (operational)	N, L, I, H[2]	I	Analysis	Operational noise impacts: The majority of pumps and motors or other equipment will be located either underground, inside a well, or inside an enclosure (e.g., building). Placing equipment in these locations effectively minimizes the sound emissions. The remaining non-emergency above ground equipment is limited to transformers which are similar in size to the one already operating at IM-3, and communication/control panels. Additional noise will be created by wind whistling by and impacting with aboveground structures.	I	Analysis	Operational noise impacts: The majority of pumps and motors or other equipment will be located either underground, inside a well, or inside an enclosure (e.g., building). Placing equipment in these locations effectively minimizes the sound emissions. The remaining non-emergency above ground equipment is limited to transformers which are similar in size to the one already operating at IM-3, and communication/control panels. Additional noise will be created by wind whistling by and impacting with aboveground structures.
Construction Impacts	N, L, I, H[2]	H	Analysis	This route would run in the Southwest Gas (4") right of way from the IM-3 access road to Bat Cave Wash on Route 66. Installation of aboveground pipe supports would not be typical within a gas pipe right of way. This approach might be rejected resulting in re-design or delays or additional disturbance. Construction of an aboveground pipe on the steep slope located west of the MW-20 Bench will be near the SoCal gas (34") pipeline. To protect the pipe storm drainage improvements are needed (4 drain pipes and earthwork) and would be within the right-of-way. This approach might need to be modified resulting in re-design or delays.	H	Analysis	This route would run in the Southwest Gas (4") right of way from the IM-3 access road to Bat Cave Wash on Route 66. Installation of aboveground pipe supports would not be typical within a gas pipe right of way. This approach might be rejected resulting in re-design or delays or additional disturbance. Construction of an aboveground pipe on the steep slope located west of the MW-20 Bench will be near the SoCal gas(34") pipeline. To protect the pipe storm drainage improvements are needed (4 drain pipes and earthwork) and would be within the right-of-way. This approach might need to be modified resulting in re-design or delays. Construction of two bridges - 330 feet long to cross Bat Cave Wash and 280 feet long to cross a BNSF access road will require consultation with the owners resulting in potential design changes or delays.
Fire Department Impacts	N, L, I, H[2]	H	Analysis	Reducing the available width of Route 66 and IM-3 may result in violations of the San Bernardino County Fire Code for vehicle road access. The Code (Section 503.1 Article III) states that roads must have 14 feet 6 inches vertical clearance and 26 feet in width. The low pipe racks and other pipe bridges considered for this alternative may need to be changed to taller structure or to an elevated continuous structure to meet the vertical space requirements. Variances for narrow roads are allowed if there are sufficient turnouts (every 600 feet), however these aboveground structures may prevent the minimum width (not specified in the Code, but designated by the Fire Department). The result of seeking this variance may cause additional disturbance to re-locate the pipe supports off the road. Due to the rough terrain and numerous gullies, this may also require additional support structures.	H	Analysis	Reducing the available width of Route 66 and IM-3 may result in violations of the San Bernardino County Fire Code for vehicle road access. The Code (Section 503.1 Article III) states that roads must have 14 feet 6 inches vertical clearance and 26 feet in width. The low pipe racks and other pipe bridges considered for this alternative may need to be changed to taller structure or to an elevated continuous structure to meet the vertical space requirements. Variances for narrow roads are allowed if there are sufficient turnouts (every 600 feet), however these aboveground structures may prevent the minimum width (not specified in the Code, but designated by the Fire Department). The result of seeking this variance may cause additional disturbance to re-locate the pipe supports off the road. Due to the rough terrain and numerous gullies, this may also require additional support structures.

Worker Safety Impacts (Construction)	N, L, I, H[2]	H	Analysis	Aboveground construction is in general less hazardous than working underground. The route follows some existing access roads, but has some cross-country routes that increase risk. -Increased risk for 140 foot long pipe bridge and 1-50 foot pipe bridge (grade separation) requiring scaffolding and lifting equipment; segment from MW-20 Bench west up steep slope, and route to IRL-4 along a steep narrow road. -Addition of the aboveground pipe on steel support structures, would require the addition of guard rails to protect the pipe from incidental contact. This would reduce the width of the IM-3 access road and Route 66 west of IM-3 in several locations (see also Construction Impacts) resulting in additional safety hazards. -Natural gas (Southwest (4") and SoCal Gas (34")) pipe crossings south of IRL-3 along pipeline H and SoCal Gas (34") at the top of the slope overlooking National Trails Highway and the MW-20 Bench present safety hazards.	H	Analysis	Aboveground construction is in general less hazardous than working underground. The route follows some existing access roads, but has some cross-country routes that increase risk. -Increased risk for 280-foot and 330-foot pipe bridges and 1-30 foot pipe bridge (grade separation) requiring scaffolding and lifting equipment, segment from MW-20 Bench west up steep slope, and route to IRL-4 along a steep narrow road. -Addition of the aboveground pipe on steel support structures, would require the addition of guard rails to protect the pipe from incidental contact. This would reduce the width of the IM-3 access road and Route 66 west of IM-3 in several locations (see also Construction Impacts) resulting in additional safety hazards. -Natural gas (Southwest (4") and SoCal Gas (34")) pipe crossings south of IRL-3 along pipeline H and SoCal Gas (34") at the top of the slope overlooking National Trails Highway and the MW-20 Bench present safety hazards.
Worker Safety Impacts (Operational)	N, L, I, H[2]	H	Analysis	For O&M, routing electrical overhead puts power lines closer to well vaults, which increases risk of inadvertent contact or static discharge during well maintenance. Guard rails and aboveground piping structures limit access to equipment increasing risk of incidents during maintenance or for O&M personnel vehicle accidents. Working near active gas pipelines creates additional safety hazards. Personnel working inside secondary containment vaults (11 for this alternative) would require a confined space entry.	H	Analysis	For O&M, routing electrical overhead puts power lines closer to well vaults, which increases risk of inadvertent contact or static discharge during well maintenance. Guard rails and aboveground piping structures limit access to equipment increasing risk of incidents during maintenance or for O&M personnel vehicle accidents. Working near active gas pipelines creates additional safety hazards. Personnel working inside secondary containment vaults (11 for this alternative) would require a confined space entry.
Worker Safety Impacts (Decommissioning)	N, L, I, H[2]	H	Analysis	During decommissioning, removal of aboveground structures increase safety hazard (see Decommissioning Impacts below) especially when working near active natural gas pipelines.	H	Analysis	During decommissioning, removal of aboveground structures increase safety hazard (see Decommissioning Impacts below) especially when working near active natural gas pipelines.
Schedule Impacts [15]	N, L, I, H[2]	65 days	Scaled based on material take-off and compared to 60% design schedule	Construction only as the alternative is described here. Additional EIR review or re-design caused by others would increase overall project schedule. A supplemental EIR review could extend the schedule 1 to 2 years.	75 days	Scaled based on material take-off and compared to 60% design schedule	Construction only as the alternative is described here. Additional EIR review or re-design caused by others would increase overall project schedule. A supplemental EIR review could extend the schedule 1 to 2 years.
EIR Impacts	N, L, I, H[2]	H	Opinion	Additional CEQA review will be needed. The type of additional CEQA review required depends whether the design has new, significant impacts that were not disclosed in the EIR. If there are new, significant impacts, a supplemental EIR would be required and an addendum would not suffice. Further analysis will allow the technical team to determine whether this alternative may have new, significant impacts. Whether this option causes increased aesthetic impacts will need to be evaluated; if such impacts can be mitigated to a less than significant level, then an addendum could be prepared. If not, a supplemental EIR would be required. A supplemental EIR would result in a delay of approximately 12 to 24 months. The County Fire Code allows for variances from certain requirements. If a variance cannot be obtained, this could result in Fire Code violations and this would be is a new impact that has not been evaluated. If this impact can be mitigated to a less than significant level, an addendum can be prepared. If this impact cannot be mitigated and a variance is required, DTSC could interpret the need for a variance as a new impact triggering the need for a subsequent EIR.	H	Opinion	Additional CEQA review will be needed. The type of additional CEQA review required depends whether the design has new, significant impacts that were not disclosed in the EIR. If there are new, significant impacts, a supplemental EIR would be required and an addendum would not suffice. Further analysis will allow the technical team to determine whether this alternative may have new, significant impacts. Whether this option causes increased aesthetic impacts will need to be evaluated; if such impacts can be mitigated to a less than significant level, then an addendum could be prepared. If not, a supplemental EIR would be required. A supplemental EIR would result in a delay of approximately 12 to 24 months. The County Fire Code allows for variances from certain requirements. If a variance cannot be obtained, this could result in Fire Code violations and this would be is a new impact that has not been evaluated. If this impact can be mitigated to a less than significant level, an addendum can be prepared. If this impact cannot be mitigated and a variance is required, DTSC could interpret the need for a variance as a new impact triggering the need for a subsequent EIR.
Historical/Archaeological Impacts [12, 13]	N, L, I, H[2]	L	Analysis	Available site location information utilized along with draft Geoarchaeological report. Approx. 50% of route will impact Route 66. All other sites avoided.	L	Analysis	Available site location information utilized along with draft Geoarchaeological report. Approx. 25% of route will impact Route 66. All other sites avoided.
Likelihood of Failure to Detect or Contain Leaks	N, L, I, H[2]	I	Analysis	All secondary containment piping accessible for visual inspection, but water carrier pipes not accessible. Low point sumps equipped with level switches will be primary means of monitoring for and containing leaks. See also O&M Impacts caused by use of double-contained steel pipe.	I	Analysis	All secondary containment piping accessible for visual inspection, but water carrier pipes not accessible. Low point sumps equipped with level switches will be primary means of monitoring for and containing leaks. See also O&M Impacts caused by use of double-contained steel pipe.

O&M Impacts	N, L, I, H[2]	I	Analysis	O&M impacts are higher than the current design in large part due to the use of steel pipe through most of the route. Mortar lined steel pipe will resist corrosion, but the lining has a shorter life than underground plastic piping. In addition, the liner will not be suitable for pipe cleaning using strong chemicals or aggressive mechanical methods. In addition, minerals in the groundwater may precipitate on the liner or biological materials may to adhere to the liner reducing pipe capacity. Aboveground pipe supports and steel pipe increase difficulty of maintenance of piping requiring more equipment and personnel. in addition, the aboveground structures will require sand blasting and painting every 10 years. This alternative is based on the City of Needles supplying power for the remedy facilities. Needles currently supplies the IM No. 3 plant and due to several factors is subject to numerous outages, particularly during the summer monsoon season. In the absence of a backup generator installed in the area, there would be many shutdowns every year. Using radio as a transmission method for control and communications is less reliable than a cable or wired connection. This would affect either control of injection wells or logging of flows into or out of the wells. Results of this include service interruptions for well backwashing and reducing the accuracy of water accounting from the Colorado River basin. Currently multiple companies (PG&E, BNSF, Southwest Gas, SoCal Gas, City of Needles) use the IM No. 3 access road and Route 66 west of IM No. 3. These roads already function as a one-way road (as mentioned by Curt at Jan 23 TWG) when heavy/wide equipment (8 foot wide semi trailers carrying frac tanks requires approximately 21 feet working room for turns).This would primarily affect annual well rehabilitations for the 5 injection wells in the area and any major maintenance activity. Therefore, PG&E cannot reduce the width of the access road.	I	Analysis	O&M impacts are higher than the current design in large part due to the use of steel pipe through most of the route. Mortar lined steel pipe will resist corrosion, but the lining has a shorter life than underground plastic piping. In addition, the liner will not be suitable for pipe cleaning using strong chemicals or aggressive mechanical methods. In addition, minerals in the groundwater may precipitate on the liner or biological materials may to adhere to the liner reducing pipe capacity. Aboveground pipe supports and steel pipe increase difficulty of maintenance of piping requiring more equipment and personnel. in addition, the aboveground structures will require sand blasting and painting every 10 years. This alternative is based on the City of Needles supplying power for the remedy facilities. Needles currently supplies the IM No. 3 plant and due to several factors is subject to numerous outages, particularly during the summer monsoon season. In the absence of a backup generator installed in the area, there would be many shutdowns every year. Using radio as a transmission method for control and communications is less reliable than a cable or wired connection. This would affect either control of injection wells or logging of flows into or out of the wells. Results of this include service interruptions for well backwashing and reducing the accuracy of water accounting from the Colorado River basin. Currently multiple companies (PG&E, BNSF, Southwest Gas, SoCal Gas, City of Needles) use the IM No. 3 access road and Route 66 west of IM No. 3. These roads already function as a one-way road (as mentioned by Curt at Jan 23 TWG) when heavy/wide equipment (8 foot wide semi trailers carrying frac tanks requires approximately 21 feet working room for turns).This would primarily affect annual well rehabilitations for the 5 injection wells in the area and any major maintenance activity. Therefore, PG&E cannot reduce the width of the access road.
Public Safety Impacts	N, L, I, H[2]	H	Analysis	Aboveground structures increase risk of public safety incidents due to potential vehicle impacts on IM-3 access road and Route 66 west of IM-3. Greater impact given the inherent vulnerability of aboveground piping (members of the public have been known to shoot pipes) and large rocks or other debris that may strike the pipe during a storm event.	H	Analysis	Aboveground structures increase risk of public safety incidents due to potential vehicle impacts on IM-3 access road and Route 66 west of IM-3. Greater impact given the inherent vulnerability of aboveground piping (members of the public have been known to shoot pipes) and large rocks or other debris that may strike the pipe during a storm event.
Decommissioning Impacts	N, L, I, H[2]	H	Analysis	Remove power poles, pipe supports, and other aboveground equipment. (26 power poles and 170 pipe supports. 3410 lf of guard rail @ 6' spacing approx. 570 supports, 140 foot long pipe bridge and 1-50 foot pipe bridge (grade separation)) The removal of belowground infrastructure/piping as an alternative to current proposed abandon in place would result in soil excavation and disturbance along portions of piping and electrical conduit west of Bat Cave Wash to FW-1 and IRL-4. This would occur over a distance of approximately 800 feet.	H	Analysis	Remove power poles, pipe supports, and other aboveground equipment. (26 power poles and 120 pipe supports. 2380 lf of guard rail @ 6' spacing approx. 400 supports, 280-foot and 330-foot pipe bridges and 1-30 foot pipe bridge (grade separation)). The removal of belowground infrastructure/piping as an alternative to current proposed abandon in place would result in soil excavation and disturbance along portions of piping and electrical conduit west of Bat Cave Wash to FW-1 and IRL-4. This would occur over a distance of approximately 800 feet.
Ground Disturbance	Lineal Feet	121	Material take-off	Not updated for change to underground for approximately 800 feet.	210	Material take-off	Not updated for change to underground for approximately 800 feet.
Displaced soil volume	cubic yds	562	Material take-off	Not updated for change to underground for approximately 800 feet.	356	Material take-off	Not updated for change to underground for approximately 800 feet.
Capital Cost	$	$6,800,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs	$9,800,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs
O&M Cost	$ (30 year PV, 7% interest)	$1,500,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs	$2,000,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs
Decommissioning Costs	$	$1,700,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs	$2,400,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs

PIPELINE B DESIGN ALTERNATIVE - WITH BASIS FOR EVALUATION [4]

	Evaluation Criteria	Pipeline B - Current Design	Basis for Evaluation[3]	Comments/Notes	Pipeline B Alternative 1	Basis for Evaluation[3]	Comments/Notes
Evaluation Factors							
Cultural Integrity	Present/Not Present[6]						
Visual Impacts	N, L, I, H[2]	L	Analysis	Review of remedy route and disturbance maps, site photos, Google Earth, and design drawings. First 600 feet extending west from arch bridge, would have low pipe rack on northern side of low level of visual contrast with setting and low visibility to potential viewers. The rest of the pipeline would be buried under existing roadway and would have no visual effects.	I	Analysis	Review of remedy route and disturbance maps, site photos and Google earth, and design drawings. Pipeline alternative has potential to be highly visible and cause ground disturbance that may persist in contrast to surrounding landscape. Although there is potential for high level of visual contrast, the impact will be moderate because the changes will not be visible to viewing public.
Ecological Impacts [11]	N, L, I, H[2]	L	Analysis	Pipeline route within disturbed habitat. No impacts to desert tortoise are anticipated. Work restrictions during the nesting season will minimize effects to nesting birds (SWFL and other migratory birds).	I	Analysis	Pipeline route primarily within disturbed habitat and creosote bush scrub. Some impact to hillside Palo Verde community resulting in the potential loss of individuals may occur. No impacts to desert tortoise are anticipated. Work restrictions during the nesting season will minimize effects to nesting birds (SWFL and other migratory birds).
Noise Impacts (construction)	N, L, I, H[2]	L	Similar to Pipeline B Alternative 1 configuration. (see Notes 7 and 8 below for equipment list)	Construction noise impacts are created by the number of equipment and duration of construction.	L	Similar to Pipeline B current design configuration. (see Notes 7 and 8 below for equipment list)	Construction noise impacts are created by the number of equipment and duration of construction.
Noise Impacts (operational)	N, L, I, H[2]	L	Analysis	Operational noise impacts: No pumps or motors are included in this pipeline. Additional noise will be created by wind whistling by and impacting with aboveground structures.	L	Analysis	Operational noise impacts: No pumps or motors are included in this pipeline. Additional noise will be created by wind whistling by and impacting with aboveground structures.

Construction Impacts	N, L, I, H[2]	N	Analysis	Work is within existing roadway.	L	Analysis	Work is on slopes within right of way for PG&E Line 300A. Exiting from bridge aboveground will likely require using Kinder Morgan infrastructure for use as supports. Kinder Morgan and SoCal Gas will need to grant permission to cross under their pipes. Design may need to be changed to obtain approval for installation resulting in re-design or delays or additional disturbance. Construction along slopes will likely involve installing pipe supports on rock.
Fire Department Impacts	N, L, I, H[2]	N	Analysis	No fire access is needed.	N	Analysis	No fire access is needed.
Worker Safety Impacts (Construction)	N, L, I, H[2]	L	Analysis	Similar since construction methods are almost the same.	I	Analysis	Similar since construction methods are almost the same. Greater than current design due to pipe being placed on slope south of existing gas line (Line 300A).
Worker Safety Impacts (Operational)	N, L, I, H[2]	L	Analysis	Operational safety concerns are related to accessing piping (aboveground or underground). Some sections are near active gas pipeline (Line 300A).	I	Analysis	Operational safety concerns are somewhat greater than current design alternative because of route being placed on slope. Alternative route crosses active gas lines.
Worker Safety Impacts (Decommissioning)	N, L, I, H[2]	N	Analysis	No decommissioning safety impacts (see Decommissioning Impacts.	N	Analysis	No decommissioning safety impacts (see Decommissioning Impacts.
Schedule Impacts [15]	N, L, I, H[2]	33 days	Taken from 60% design schedule and scaled based on length of the pipeline under evaluation (see Notes).	Construction only as the alternative is described here. The 60% design schedule lumps the construction schedule together for all of the 9 sections of Pipeline B, while there are 3 sections under which is about 1/3 of the total length.	38 days	Taken from 60% design schedule and scaled based on length of the pipeline under evaluation.	Construction only as the alternative is described here. Additional EIR review or re-design caused by others would increase overall project schedule. A supplemental EIR review could extend the schedule 1 to 2 years.
EIR Impacts	N, L, I, H[2]	L	Opinion	The current design reflects the assumptions in the EIR. Although project refinement may necessitate further CEQA analysis, the analysis likely will be within the scope of what can be covered in an EIR addendum.	I	Opinion	Additional CEQA review will be needed. The type of additional CEQA review required depends whether the design has new, significant impacts that were not disclosed in the EIR. If there are new, significant impacts, a supplemental EIR would be required and an addendum would not suffice. Further analysis will allow the technical team to determine whether this alternative may have new, significant impacts. Following the same route as the design contemplated in the EIR helps from a CEQA perspective.
Historical/Archaeological Impacts [12, 13]	N, L, I, H[2]	L	Analysis	Available site location information utilized along with draft Geoarchaeological report. Approx. 20% of route will impact Route 66. All other sites avoided. Virtually no potential for buried archaeological sites.	L	Analysis	Available site location information utilized along with draft Geoarchaeological report. Approx. 20% of route will impact Route 66. All other sites avoided.
Likelihood of Failure to Detect or Contain Leaks	N, L, I, H[2]	N		Does not apply to freshwater piping [10].	N		Does not apply to freshwater piping [10].
O&M Impacts	N, L, I, H[2]	L	Analysis	Pipeline is accessible. The aboveground structures will require sand blasting and painting every 10 years.	I	Analysis	Additional equipment and personnel required for major pipeline maintenance. In addition, the aboveground structures will require sand blasting and painting every 10 years. The area around the west end of the Arch bridge is congested requiring additional additional equipment and personnel for maintenance .
Public Safety Impacts	N, L, I, H[2]	N	Analysis	Locked gates nearly eliminate public access to this pipeline.	N	Analysis	Locked gates nearly eliminate public access to this pipeline.
Decommissioning Impacts	N, L, I, H[2]	N	Analysis	Facilities left in service after project is completed, so no decommissioning is needed.	N	Analysis	Facilities left in service after project is completed, so no decommissioning is needed.
Ground Disturbance	Lineal Feet	245	Material take-off		280	Material take-off	
Displaced soil volume	cubic yds	126	Material take-off		77	Material take-off	
Capital Cost	$	$360,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs. Electrical not included since common (underground) to both Pipeline B alternatives.	$900,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs. Electrical not included since common (underground) to both Pipeline B alternatives.
O&M Cost	$ (30 year PV, 7% interest)	$70,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs. Electrical not included since common (underground) to both Pipeline B alternatives.	$260,000	Cost estimate	AACE Level 4[9] estimate based on conceptual layouts and material takeoffs. Electrical not included since common (underground) to both Pipeline B alternatives.
Decommissioning Costs	$	$0		Facilities retained after project ends	$0		Facilities retained after project ends

NOTES

[1] Pipelines A/H alternative descriptions noted below

Both Alternatives: above-ground electrical on poles, distributed to FW-1, IRL-1 thru IRL-4 from City of Needles supply on north side of IM-3; fiber optic on same poles, or use wireless telecom/SCADA.

Alternative Route 1: Above-ground water pipe on pipe supports going west from NTH parallel to SoCal gas pipeline to abandoned Rt. 66 alignment, then along said alignment to the north, then northwest, then west to the existing Rt. 66 alignment where it crosses Bat Cave Wash. Then follow, continuing above-ground, following pipe sections A/H routes as laid out in the 60% Basis of Design Report. Presume aerial crossing of Bat Cave Wash, per 60% Basis of Design Report.

Alternative Route 2: Above-ground water pipe on pipe supports going west from NTH parallel to SoCal gas pipeline to intersection with pipe section H route as presented in the 60% Basis of Design Report, then follow, continuing above-ground, pipe sections A & H routes as presented in the Report to wells FW-1, and IRL-1 thru IRL-4.

[2] Ratings: N = “None”; L = “Low”; I = “Intermediate”; and H = “High.” These are qualitative ratings based upon the rationale provided and not to be used in a quantitative manner, i.e., the ratings are not additive.

[3] Indicate whether the basis for evaluation is an opinion, calculation, analysis, etc.

[4] Pipeline Section B Alternative 1 - As presented in 60% design but pipe sections B1, B2 & B3 are above ground on pipe supports and power is either buried, or above-ground on power poles.

[5] Final Environmental Impact Report Volume 2 for the Topock Compressor Station Groundwater Remediation Project, California Department of Toxic Substances Control, January 2011

[6] In the Tribes’ view, this relates to a whole state of being, so there would be no graduation in the rating. Integrity is either present or it is not. Input on this criterion is to be provided by the interested tribes.

[7] Pickup truck (3 ea), Mechanics truck (1 ea), Water Truck (1 ea), Front End Loader (1 ea), Excavator (1 ea), Lift Truck (1 ea), 45 ton crane (1 ea), Welding machine (1 ea), Forklift (1 ea), Boom Truck (1 ea), Backhoe (1 ea), Walk behind compactor (1 ea),

[8] Skid Steer w/auger attachment (could be truck mounted drill rig) (1 ea (only for AG pipe supports)), Two pole trucks with a pickup for electrical OH construction.

[9] AACE = AACE International (cost engineering professional society) Level 4 estimate has +50%/-30% accuracy. This is an estimate for alternative evaluation purposes only.

[10] Piping with secondary containment includes remedy produced water and carbon-amended groundwater.

[11] Alternatives for Pipeline A & H do not extend into the floodplain for the purposes of this evaluation factor. For the Pipeline B alternatives, the eastern end of the pipeline encroaches upon potential SWFL and other migratory bird habitat near the Colorado River.

[12] Alternatives for Pipeline A & H do not extend into the floodplain for the purposes of this evaluation factor.

[13] PG&E assumes impacts on the Traditional Cultural Property within the APE determined by BLM to be eligible for the National Register of Historic Places will be analyzed under "Cultural Integrity"

[14] PG&E proposed this factor for inclusion in the matrix.

[15] Duration estimates are based on the schedule provided with the 60 percent design submittal including the location of staging areas as shown on Figure 7.6-1. Each alternative assumes multiple construction operations may be occurring simultaneously to achieve a reasonably expedited schedule. Operations could include items such as pipe support installation, pipe welding, and electrical installation. Actual duration is a function of overall project requirements, anticipated duration, resource availability, and location and availability of staging areas.

LEGEND

EIR Project Area

Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (μg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.

Freshwater Injection Well

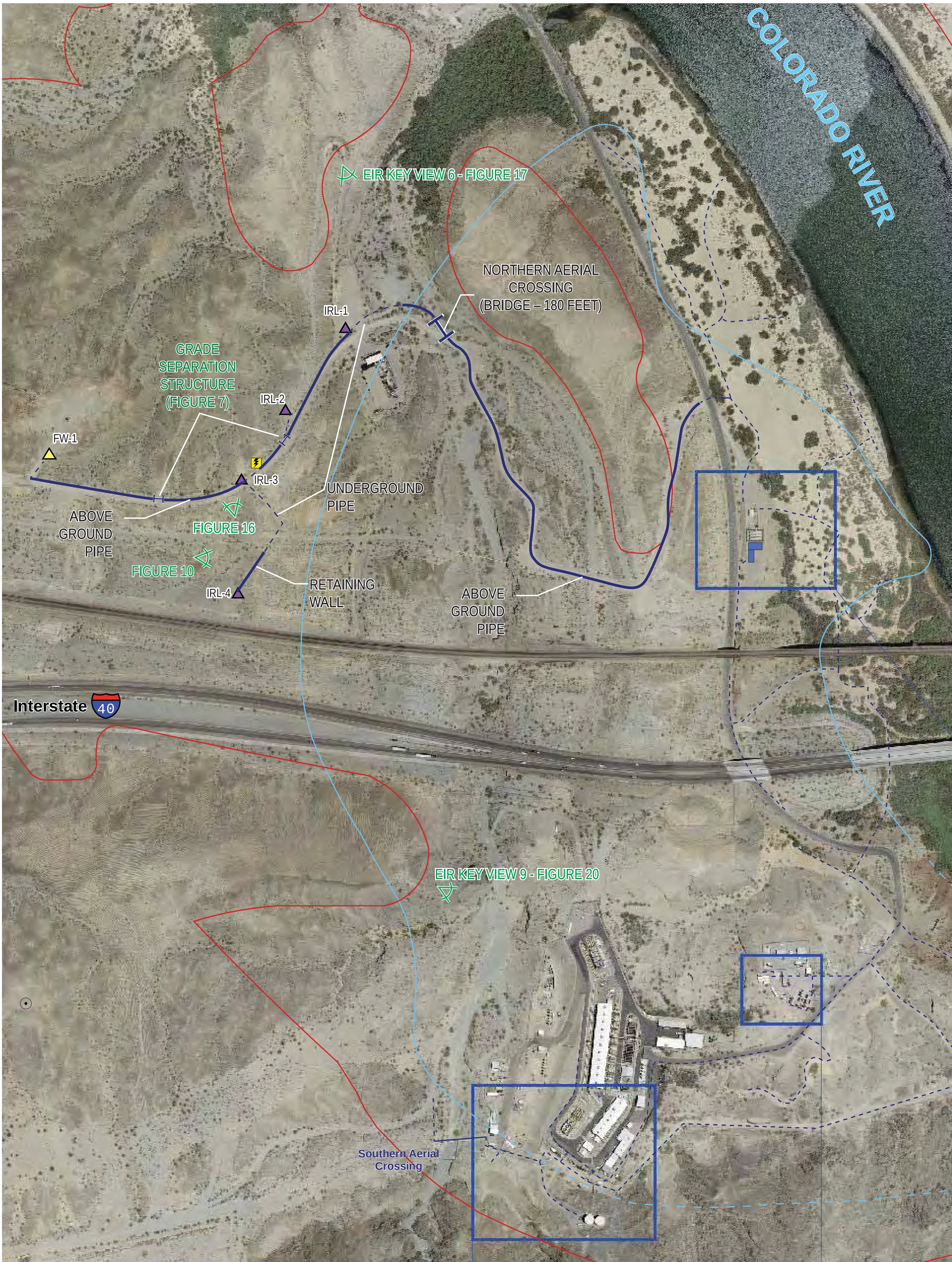
Injection Well (Inner Recirculation Loop)

Proposed Electrical Transformer Location

FIGURE 1
PIPELINES A/H CURRENT DESIGN (ALTERNATIVE 0)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

ES110813183449BAO_Topock_AboveGroundPipeline_Design_Alt.ai_111113_lho/it



Notes: 1.Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. See Figure 5 for Overhead Electical.

LEGEND

- EIR Project Area
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Proposed Electrical Transformer Location
- Bridge or Grade Separation Structure
- Aboveground Pipe
- Underground Pipe
- Viewpoint
- Proposed New Remedy Structure

FIGURE 2
PIPELINES A/H CURRENT ROUTE ABOVE GROUND (ALTERNATIVE 0a)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

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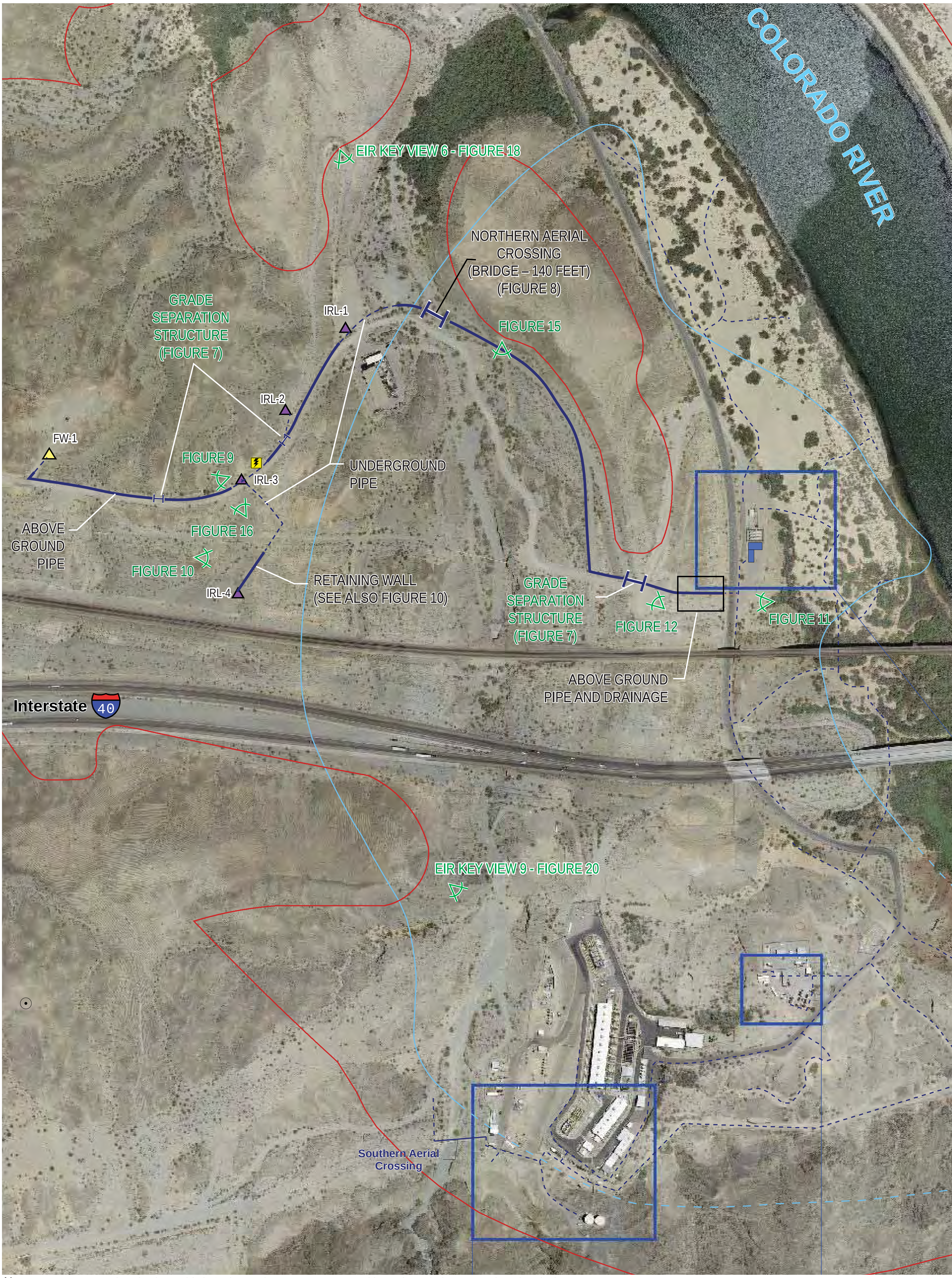

Notes: 1.Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. See Figure 5 for Overhead Electical.

LEGEND

- EIR Project Area
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Proposed Electrical Transformer Location
- Bridge or Grade Separation Structure
- Aboveground Pipe
- Underground Pipe
- Viewpoint
- Proposed New Remedy Structure

FIGURE 3
PIPELINES A/H ALTERNATIVE ROUTE 1 (ALTERNATIVE 1)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL.

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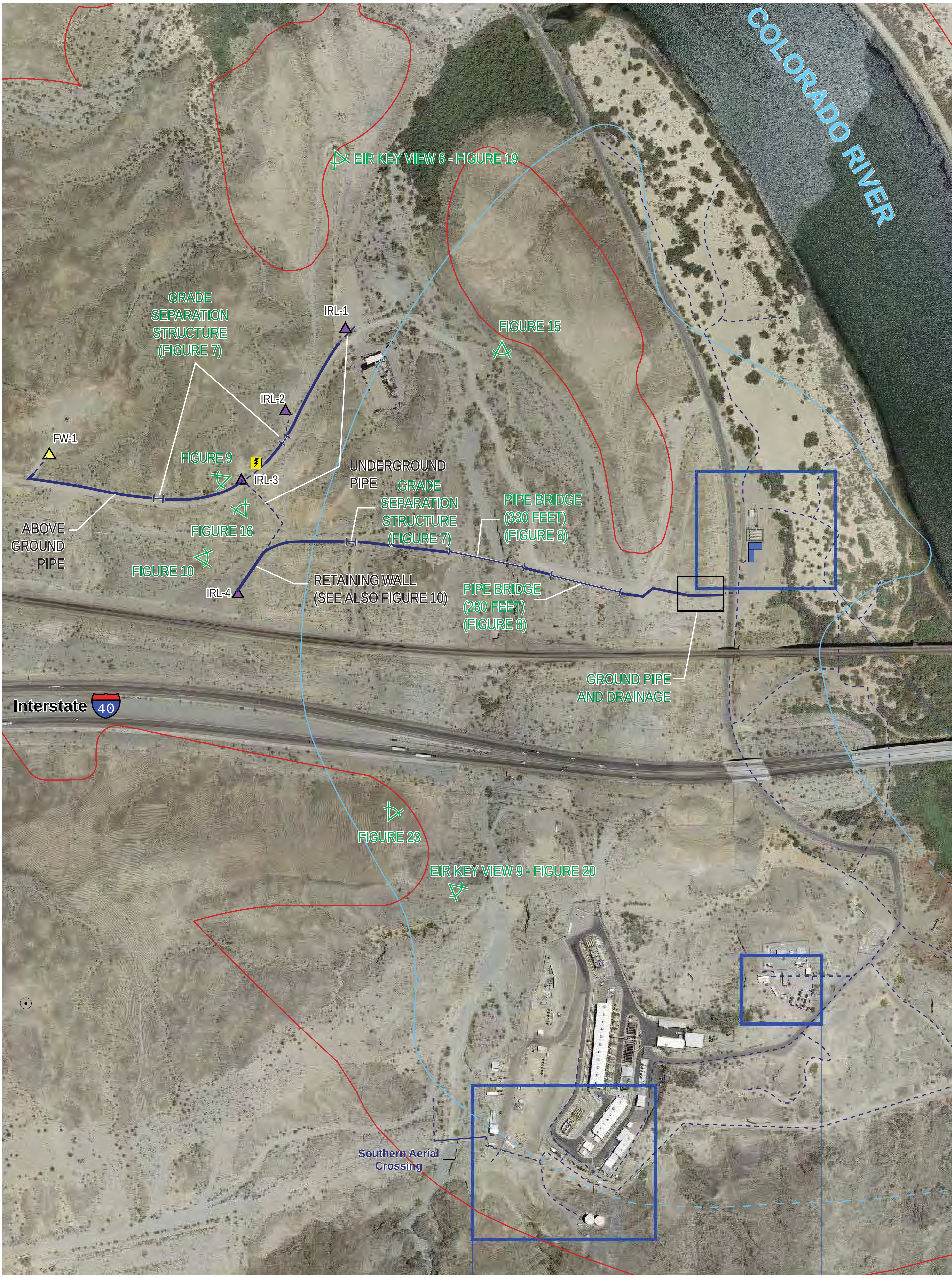


Notes: 1.Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. See Figure 5 for Overhead Electical.

LEGEND

- EIR Project Area
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Proposed Electrical Transformer Location
- Bridge or Grade Separation Structure
- Aboveground Pipe
- Underground Pipe
- Viewpoint
- Proposed New Remedy Structure

FIGURE 4
PIPELINES A/H ALTERNATIVE ROUTE 2 (ALTERNATIVE 2)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION, NEEDLES, CALIFORNIA

CH2MHILL.

ES110813183449BAO_Topock_AboveGroundPipeline_Design_Alt.ai_020714_lho/ez

Notes: 1.Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2.Three Radio transmitter towers assumed to be used to transmit signals from wells to Remedy SCADA. Towers if required would be located after field radio testing.

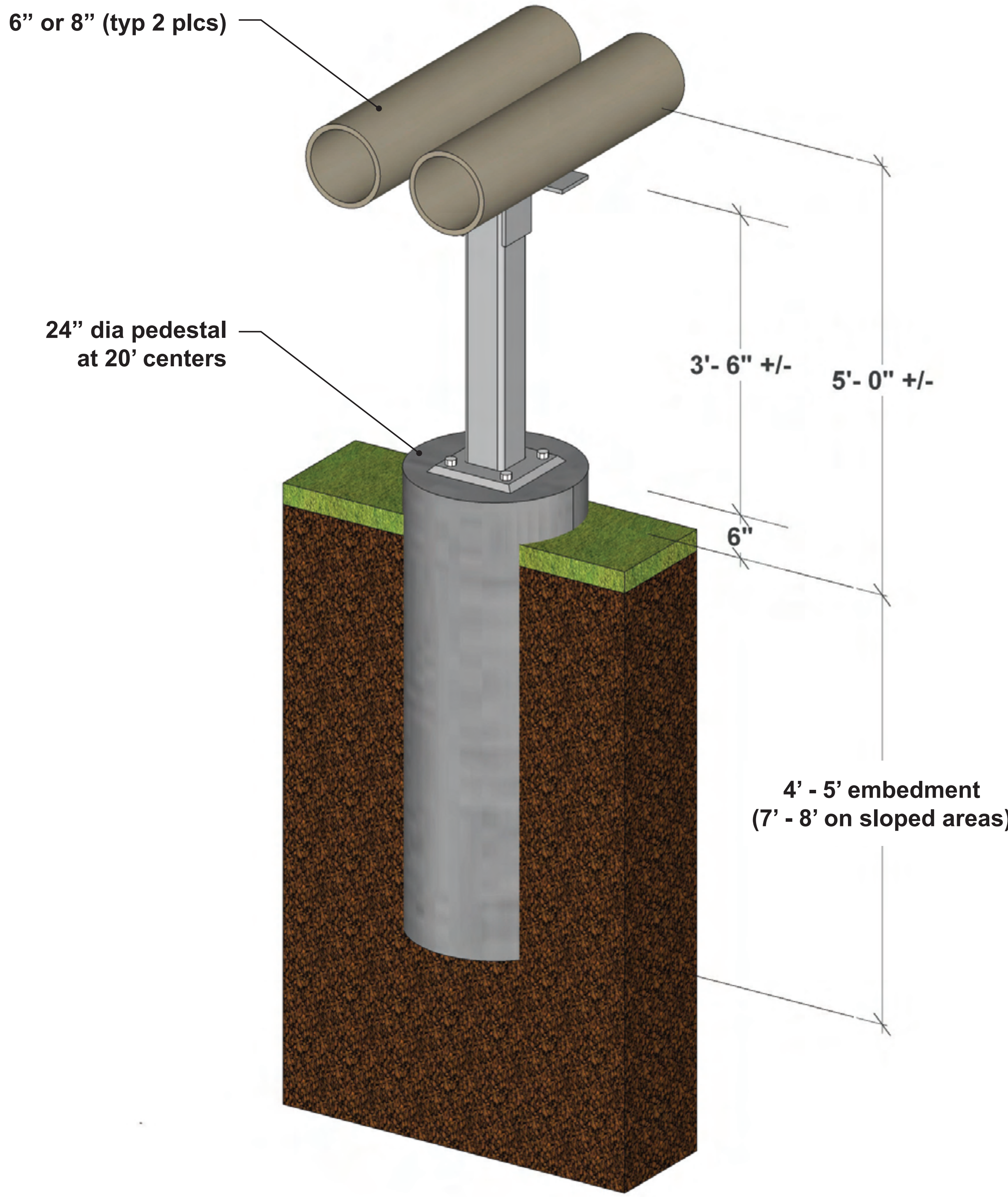
LEGEND

- EIR Project Area
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (μg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Proposed Electrical Transformer Location
- Power Pole Location

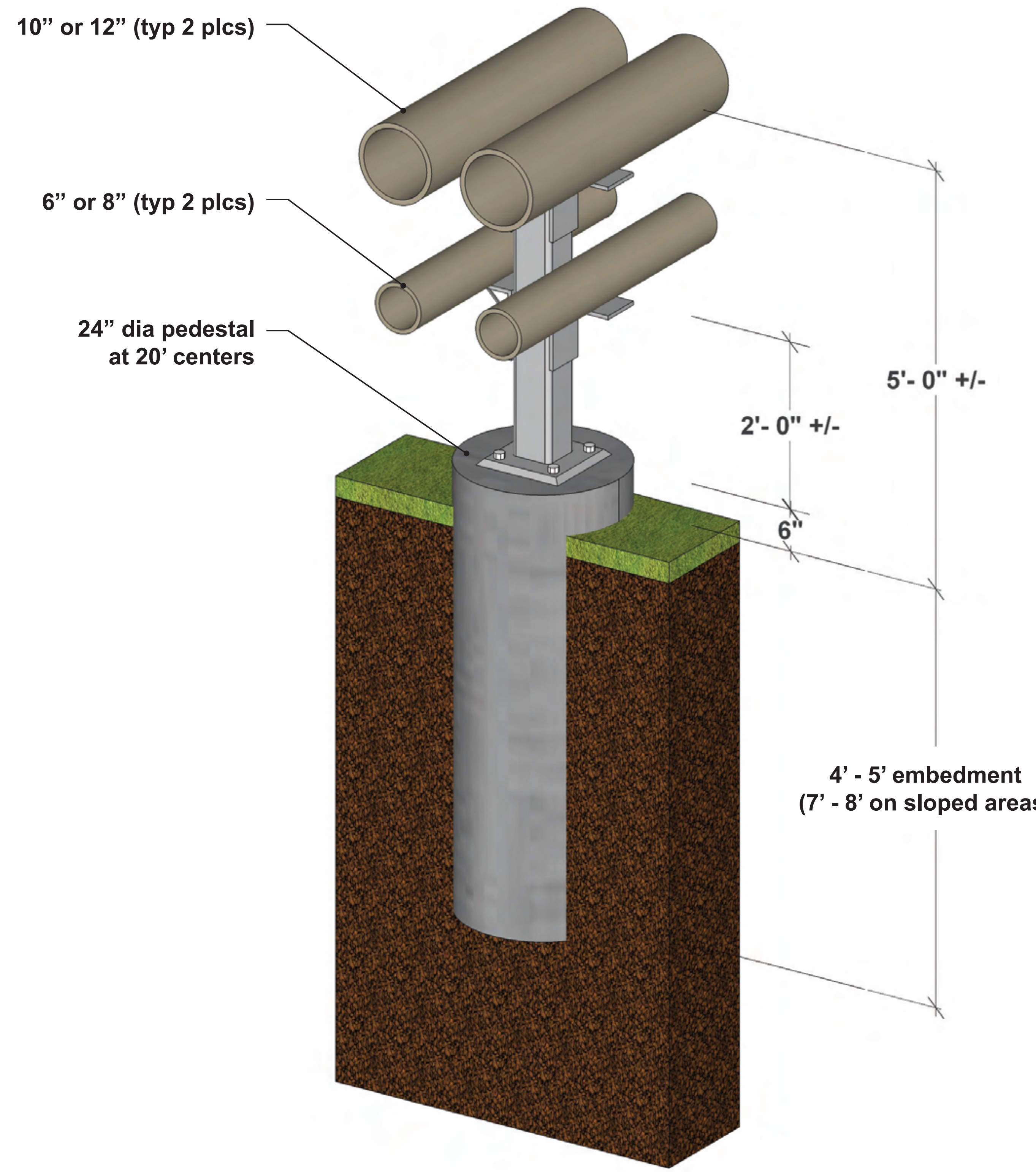
FIGURE 5
OVERHEAD ELECTRICAL LAYOUT FOR ALTERNATIVES 0A, 1 AND 2
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ES110813183449BAO_Topock_AboveGroundPipeline_Design_Alt.ai_111113_lho/it

CH2MHILL.



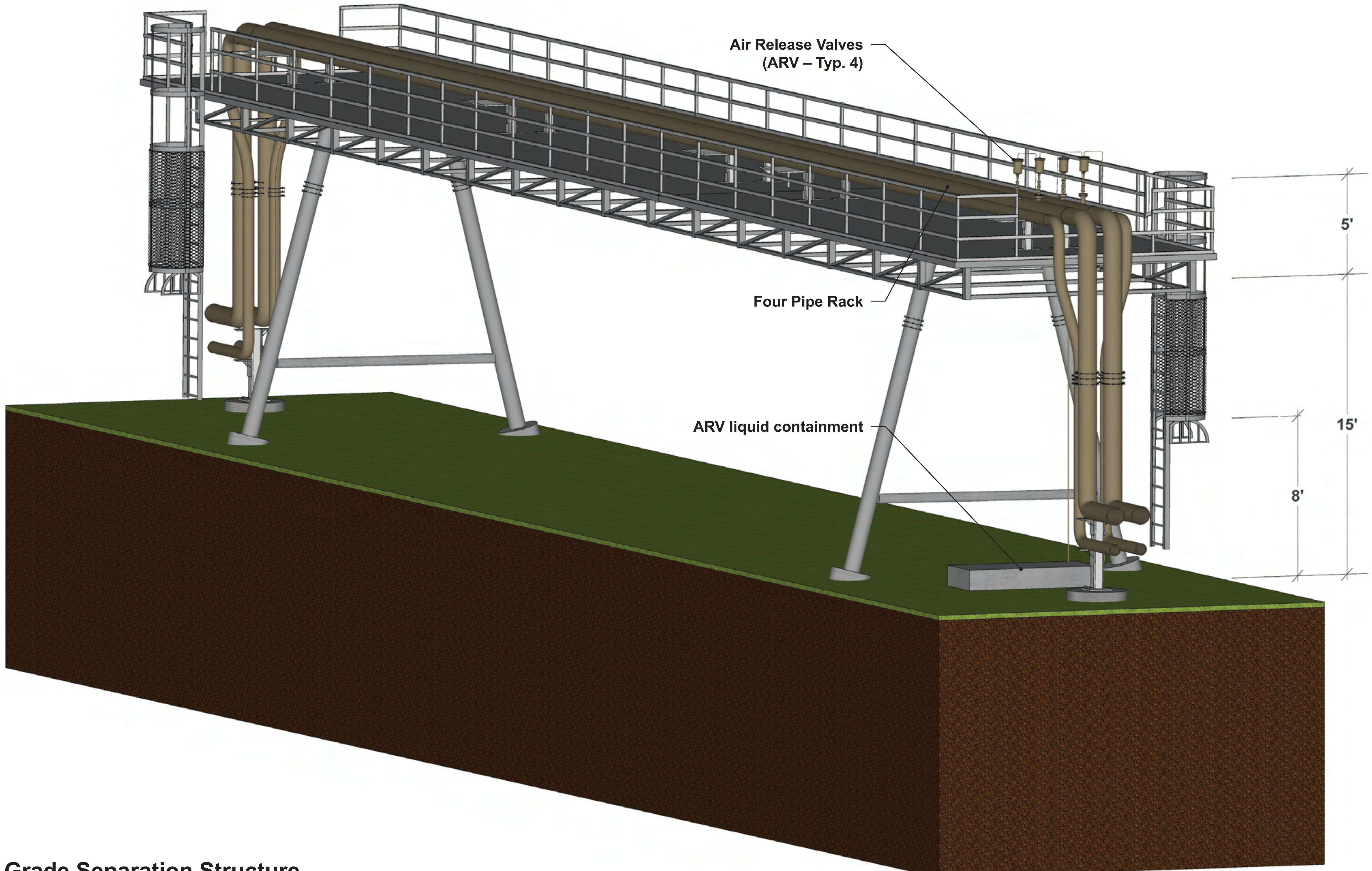
Two Pipe Low Rack



Four Pipe Low Rack

FIGURE 6
LOW PIPE RACKS
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.



Grade Separation Structure

FIGURE 7
GRADE SEPARATION STRUCTURE
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.

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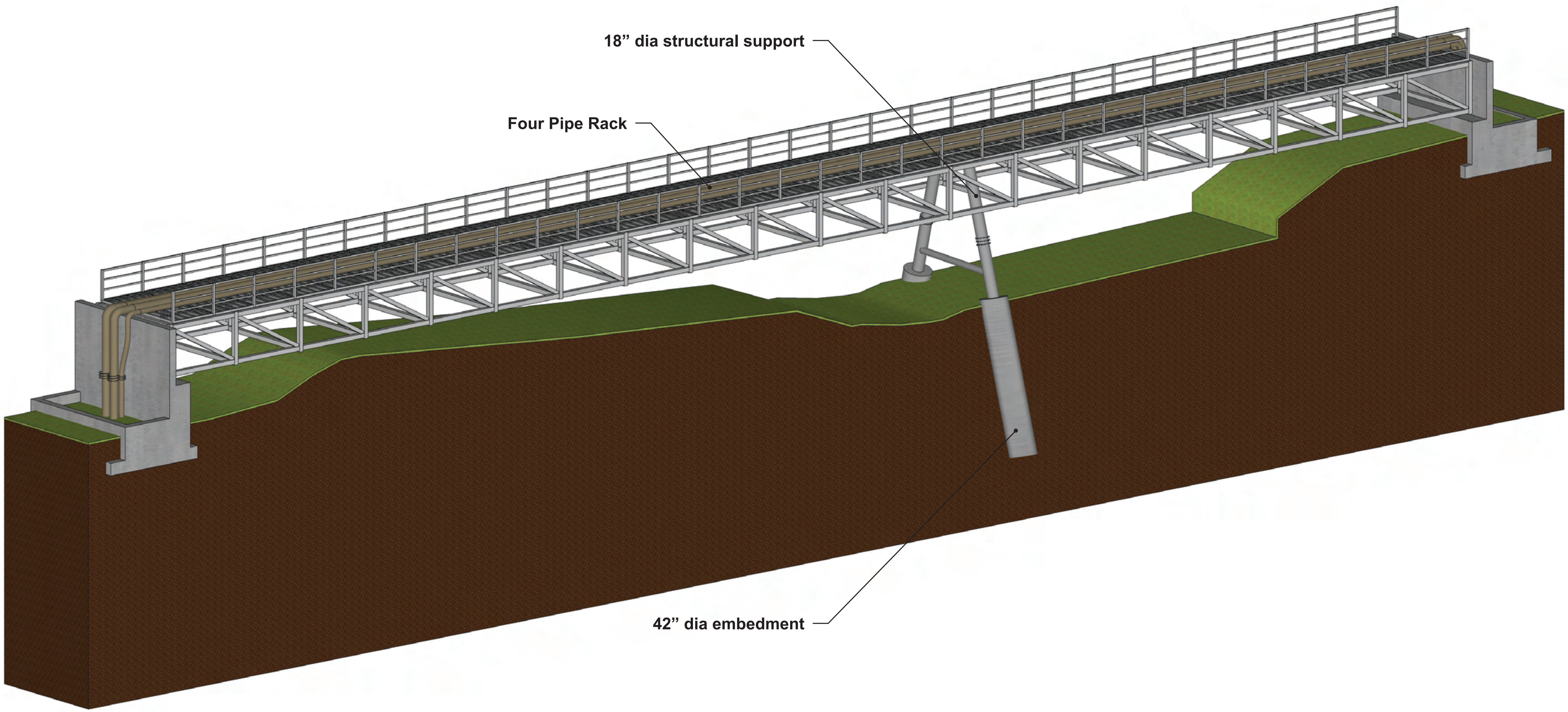
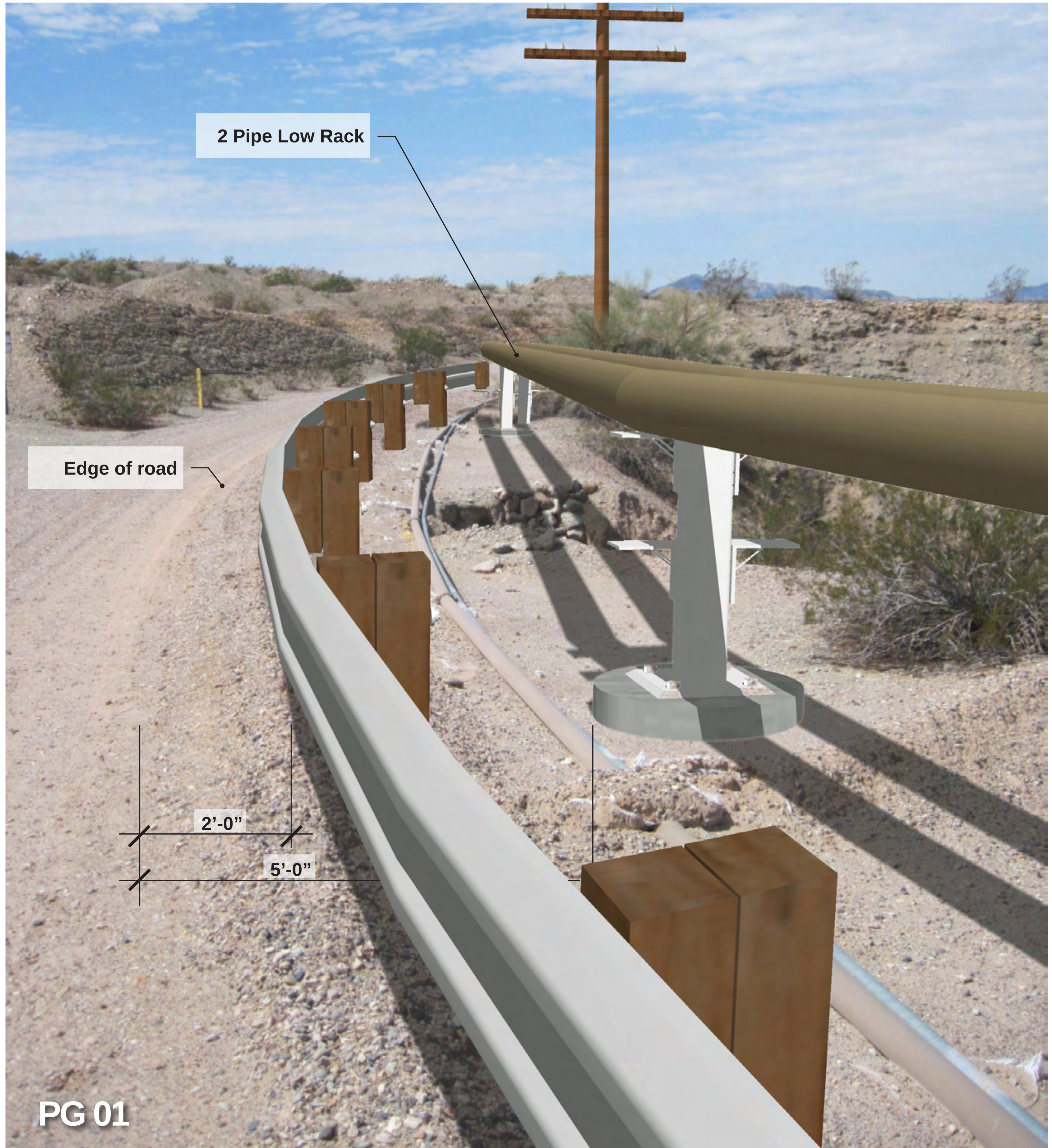


Bridge Crossing Structure

FIGURE 8
BRIDGE CROSSING STRUCTURE
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.



Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
This figure applies to Alternatives 0a (60% design current route aboveground configuration), 1 (along historic Route 66), and 2 (parallel to SoCal gas pipeline).

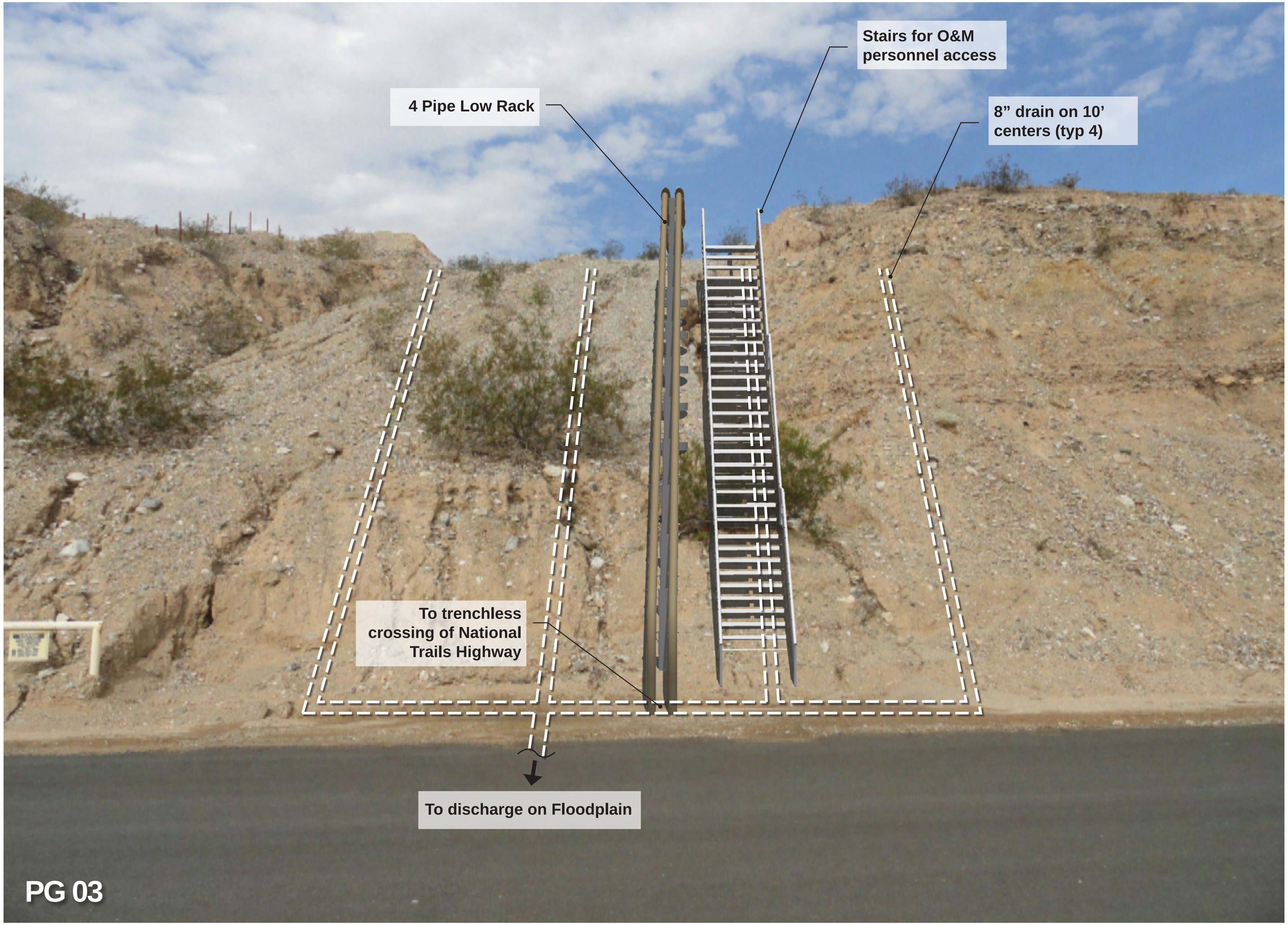
FIGURE 9
LOOKING WEST ON ROUTE 66
NEAR IRL-3
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
This figure applies to Alternatives 0a (60% design current route aboveground configuration), 1 (along historic Route 66), and 2 (parallel to SoCal gas pipeline).

FIGURE 10
LOOKING EAST AT PIPELINE H NEAR IRL-4
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

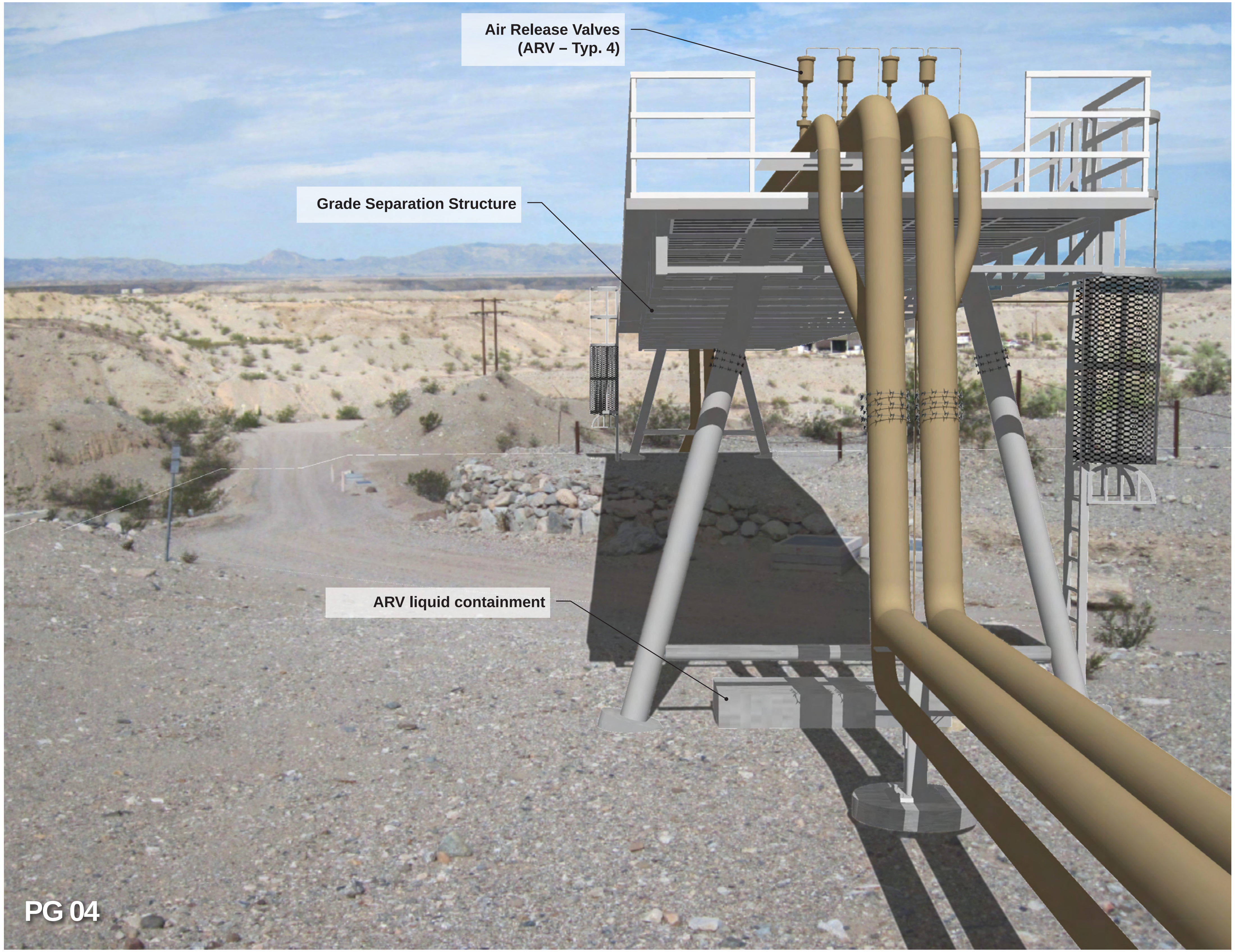
CH2MHILL.



Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
This figure applies to Alternatives 1 (along historic Route 66) and 2 (parallel to SoCal gas pipeline).

FIGURE 11
LOOKING WEST FROM MW-20 BENCH
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.



Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
This figure applies to Alternative 1 (along historic Route 66).

FIGURE 12
LOOKING AT ROUTE 66 ROCK WALL AT IM-3 ACCESS ROAD
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
This figure applies to Alternative 2 (parallel to SoCal gas pipeline).

FIGURE 13
LOOKING AT BAT CAVE WASH PIPE BRIDGE FOR ALTERNATIVE 2
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

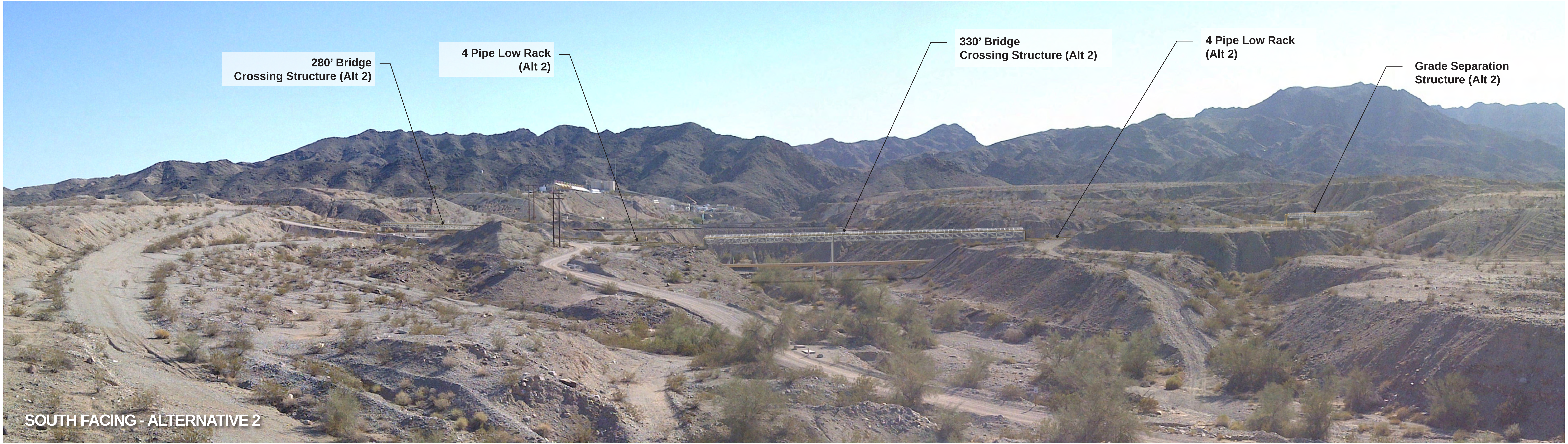
Notes:

Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.

This figure applies to Alternative 1 (along historic Route 66).

FIGURE 14
SOUTH FACING PANORAMA - ALTERNATIVE 1
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

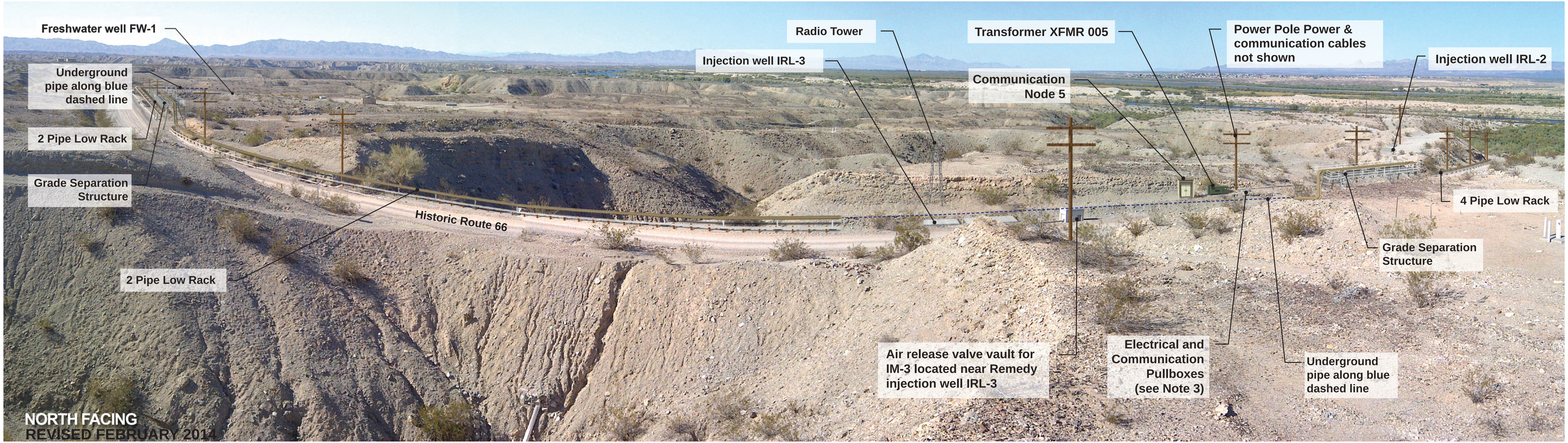


Notes:

Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.

This figure applies to Alternative 2 (parallel to SoCal gas pipeline).

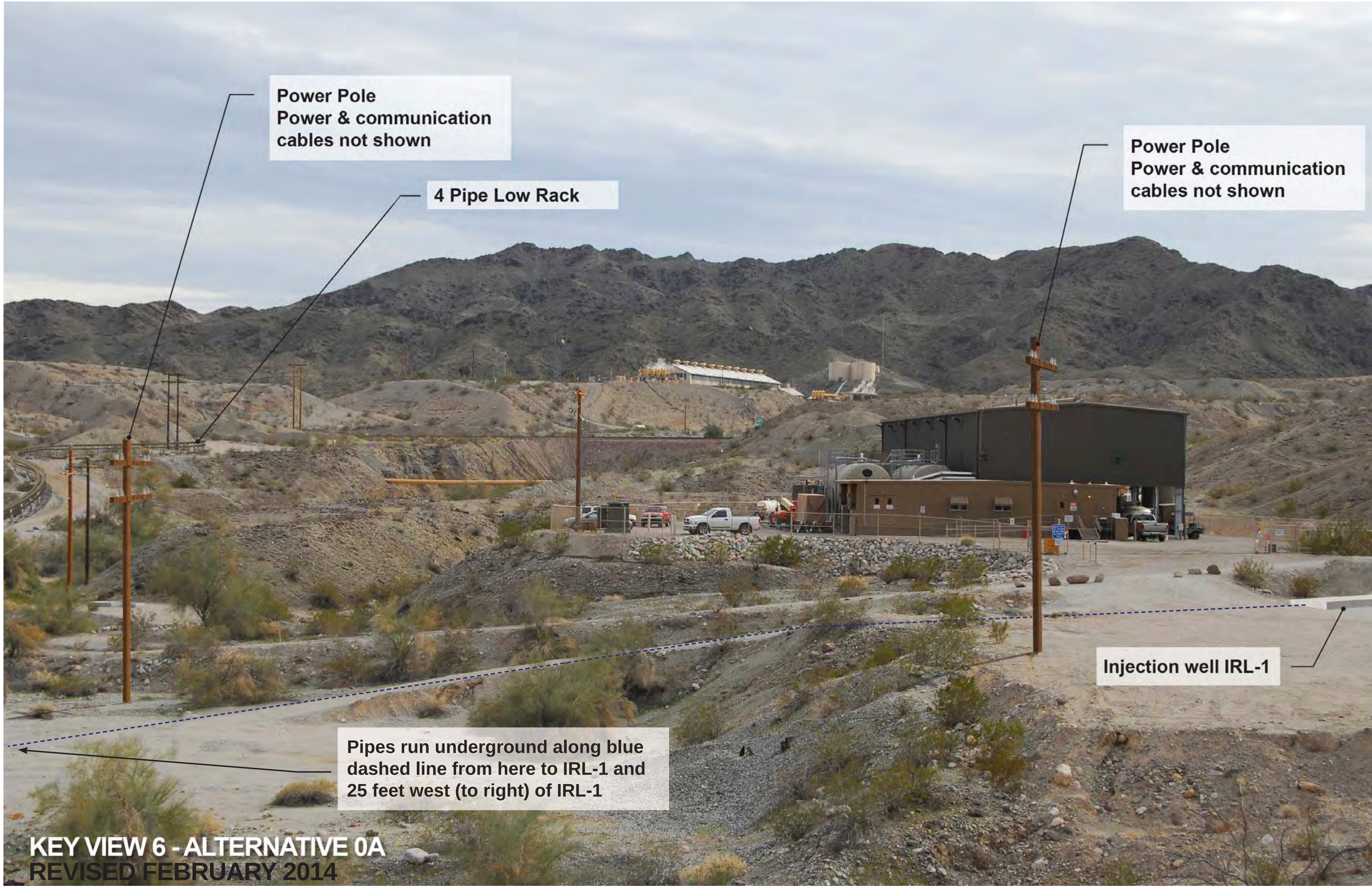
FIGURE 15
SOUTH FACING PANORAMA - ALTERNATIVE 2
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA



Notes:

1. Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. This routing is common to the current (60%) design with aboveground configuration, Alternative 1 (along historic Route 66), and Alternative 2 (parallel to SoCal gas pipeline).
3. Five additional electrical and communication pullboxes are included in the design but do not appear in this figure because they are hidden by the terrain.

FIGURE 16
NORTH FACING PANORAMA - ALTERNATIVES 0A, 1 AND 2
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA



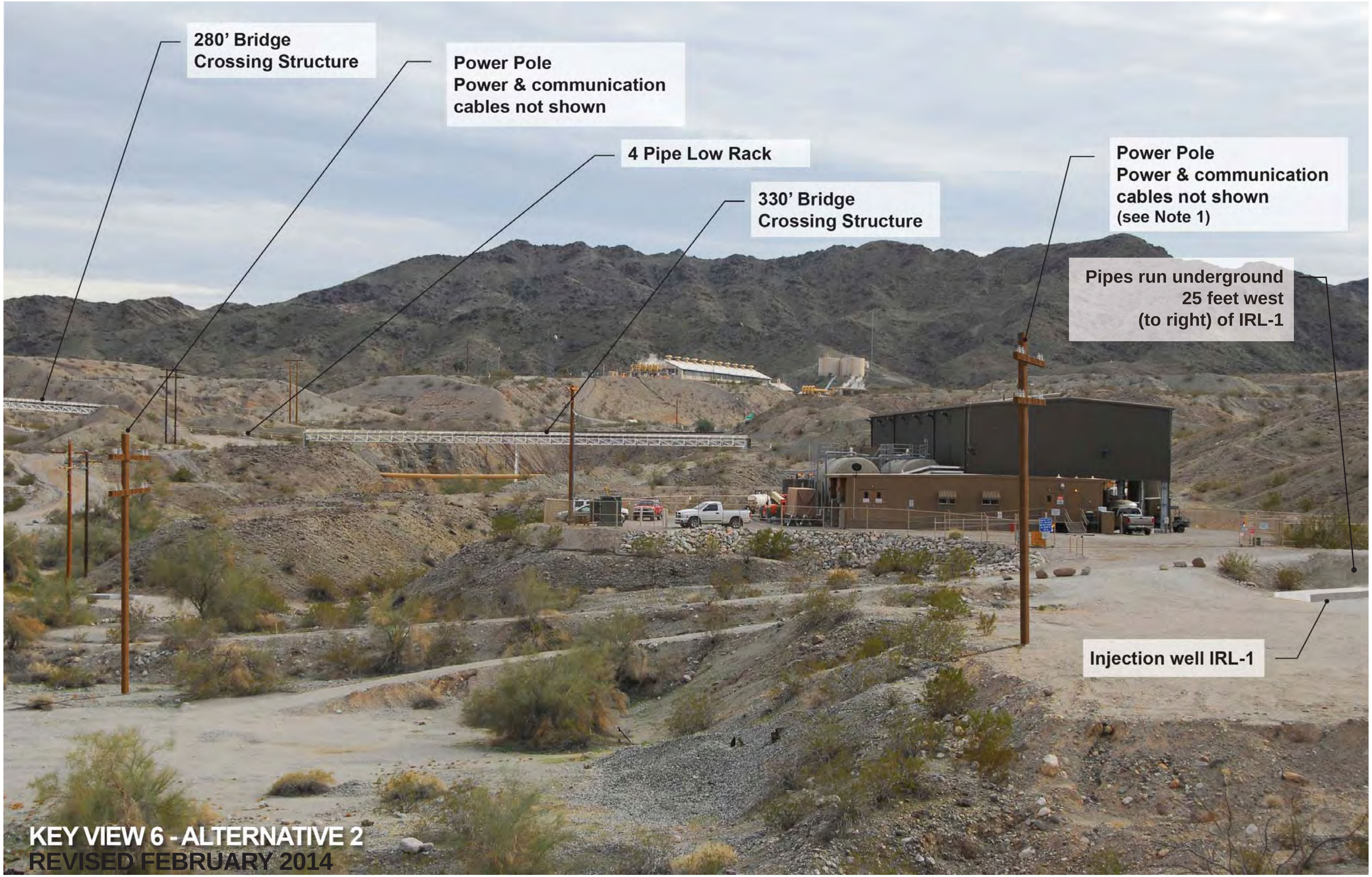
Notes:
1. Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. This figure applies to Alternative 0a (60% design current route aboveground configuration).

FIGURE 17
EIR KEY VIEW 6 - ALTERNATIVE 0A
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

Notes:
1. Underground electrical conduit from this pole to IRL-1 not shown
2. Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
3. This figure applies to Alternative 1 (along historic Route 66).

FIGURE 18
EIR KEY VIEW 6 - ALTERNATIVE 1
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.



Notes:
1. Underground electrical conduit from this pole to IRL-1 not shown
2. Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
3. This figure applies to Alternative 2 (parallel to SoCal gas pipeline).

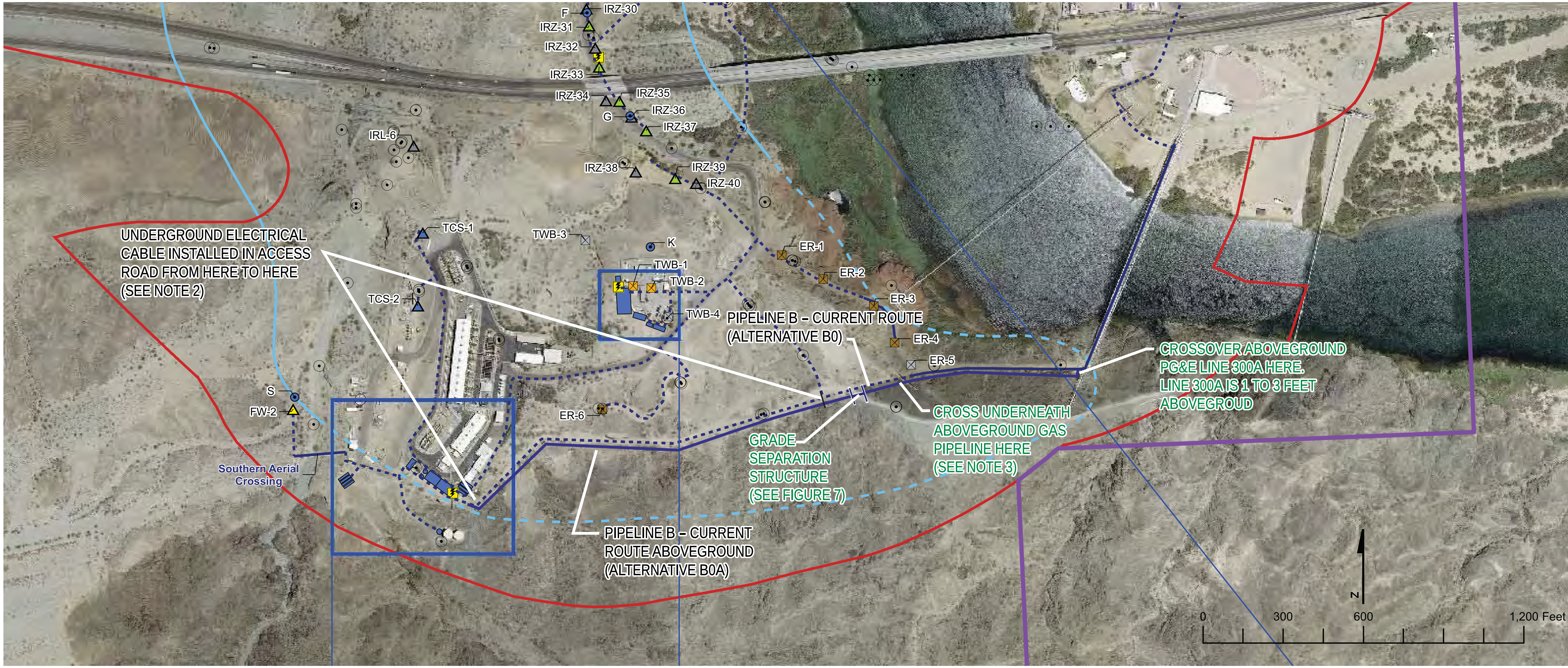
FIGURE 19
EIR KEY VIEW 6 - ALTERNATIVE 2
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.

FIGURE 20
EIR KEY VIEW 9 - ALTERNATIVES 0A, 1, 2 AND 3
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.



LEGEND

- Existing Monitoring Well
- Existing Freshwater Supply Well
- Area of Potential Effects (APE)
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.
- EIR Project Area

Remedy Wells

- Contingent Freshwater Source
- Freshwater Source
- Remedy Monitoring Well
- Extraction Well (East Ravine)
- Extraction Well (NTH IRZ)
- Extraction Well (Riverbank)
- Extraction Well (Transwestern Bench)
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Injection Well (NTH IRZ)
- Injection Well (Topock Compressor Station)
- Future Provisional Extraction Well
- Future Provisional Injection Well

Pipeline Corridor for Remedy

- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/Contingent Fresh Water Pipe

Remedy Facilities

- Proposed New Remedy Structure

- Future Provisional Electrical Transformer
- Proposed Electrical Transformer Location

Notes:
1. Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. Electrical (12 kV direct-buried cable) is underground from Pipeline J to Compressor Station for both alternatives.
3. For this figure, it is assumed that the water line can be installed beneath the aboveground gas pipeline and also stay 12 feet away from PG&E's Line 300A gas pipeline. If this is not allowed, then possible options include installing a longer pipe bridge (see Figure 8) encompassing the grade separation structure, a 30 foot grade separation structure could be installed here, or the pipe could be re-routed further south to cross over the pipeline when it is underground.

FIGURE 21
PIPELINE B - CURRENT ROUTE (ALTERNATIVE B0) AND CURRENT ROUTE ABOVEGROUND (ALTERNATIVE B0A)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

Notes: 1.Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. For a simulation of this alternative see Figure 17.

LEGEND

- EIR Project Area
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Proposed Electrical Transformer Location
- Bridge or Grade Separation Structure
- Aboveground Pipe
- Underground Pipe
- Viewpoint
- Proposed New Remedy Structure
- Power Pole Location
- Overhead Power Line
- City of Needles Power Pole Location
- City of Needles Power Line

FIGURE 22
PIPELINES A/H HYBRID ALTERNATIVE WITH OVERHEAD ELECTRICAL LAYOUT (ALTERNATIVE 3)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

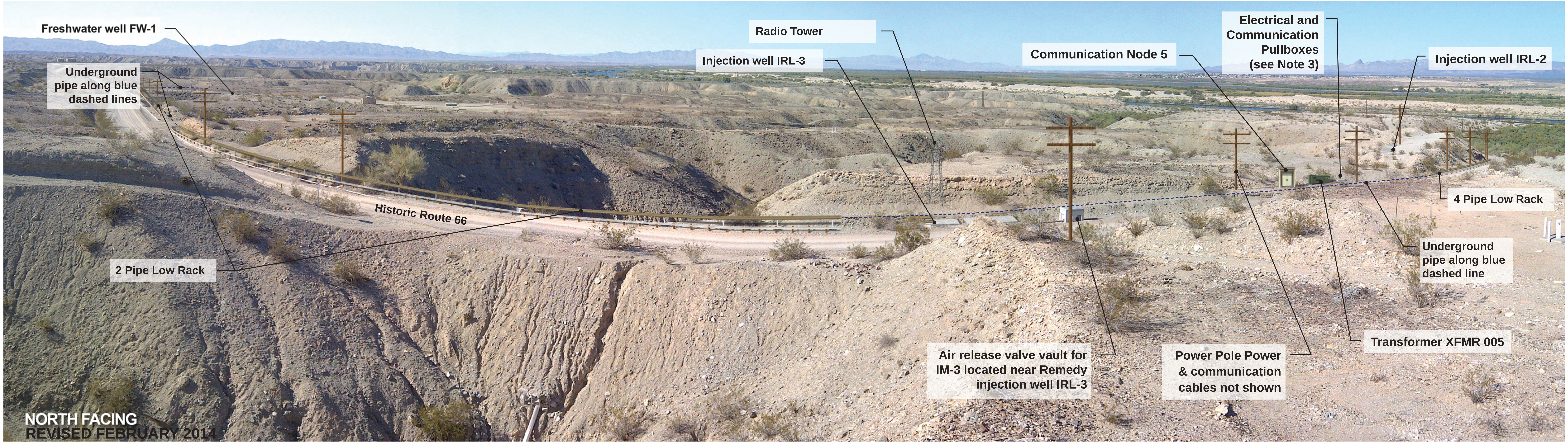
ES110813183449BAO_Topock_AboveGroundPipeline_Design_Alt.ai_020714_lho

Notes:

Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.

This figure applies to Alternative 2 (parallel to SoCal gas pipeline).

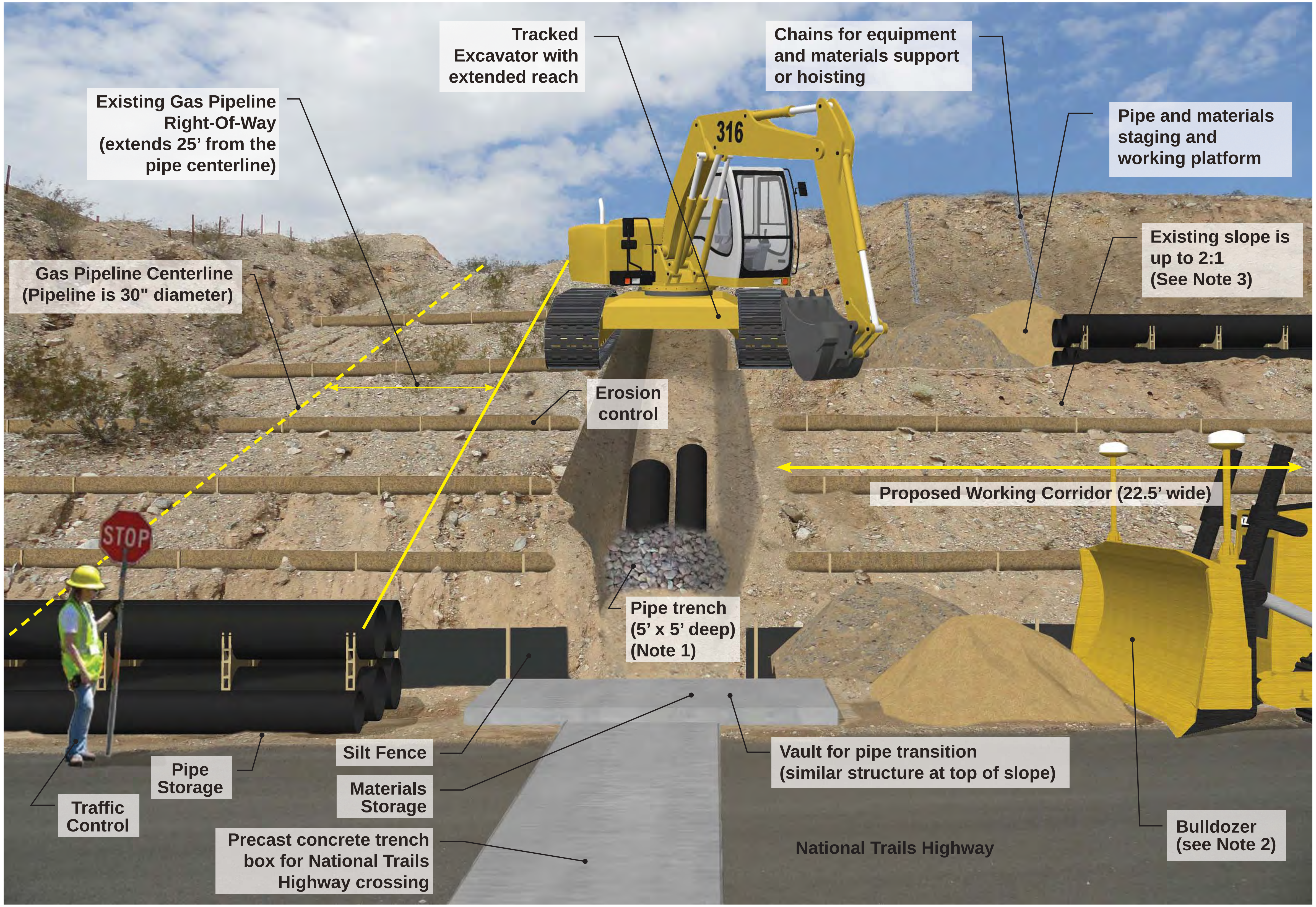
FIGURE 23
NORTH FACING PANORAMA - ALTERNATIVE 2
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA



Notes:

1. Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. This routing is for the hybrid alternative 3.
3. Five additional electrical and communication pullboxes are included in the design but do not appear in this figure because they are hidden by the terrain.

FIGURE 24
NORTH FACING PANORAMA - ALTERNATIVE 3
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA



Notes:
Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design. Dimensions shown are not to scale.
This figure applies to Alternative 3 TRC Hybrid Alternative.

1. Water pipes and electrical conduit will be installed in larger casing or carrier pipes (24" dia. and 18" dia., respectively).
2. Additional equipment not shown may include pipe welding machines, skid steer loader, second bulldozer, trucks for materials transport, and generator.
3. A drainage system consisting of surface grading (to the north), 3 catch basins, and a buried drain pipe (12" diameter) is assumed to be placed in the working corridor and is not shown. The drain pipe is assumed to extend across National Trails Highway and discharge to the Floodplain.

FIGURE 25
SEGMENT 1 SCHEMATIC OF TRENCH CONSTRUCTION
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

DRAFT Technical Memorandum

From: TRC
To: DTSC and DOI/BLM
Re: Suggested Alternative for Pipeline Segment A/H and B
Date: December 17, 2013

After discussing and evaluating the Department of Interior's Pipeline Evaluation Matrix, PG&E's responses to 60% comments, and the PG&E maps and visual simulations (provided at the November 19-20, 2013 TWG meeting in Henderson, NV), the TRC provides the following recommendations concerning pipeline segments.

All Pipeline Segments

The TRC recommends that ALL below ground infrastructure for all pipeline segments be removed upon completion of the remedy, as part of the decommissioning process.

Pipeline Segment A/H

We recommend Pipeline Alternative A/H Route 2 (Figure 4 of the above-identified visual simulations - attached), with the following recommended modifications and clarifications. The recommendation for Alternative Route 2 is based on our understanding of Tribal preference that the pipeline segment be relocated away from area B to the greatest extent possible.

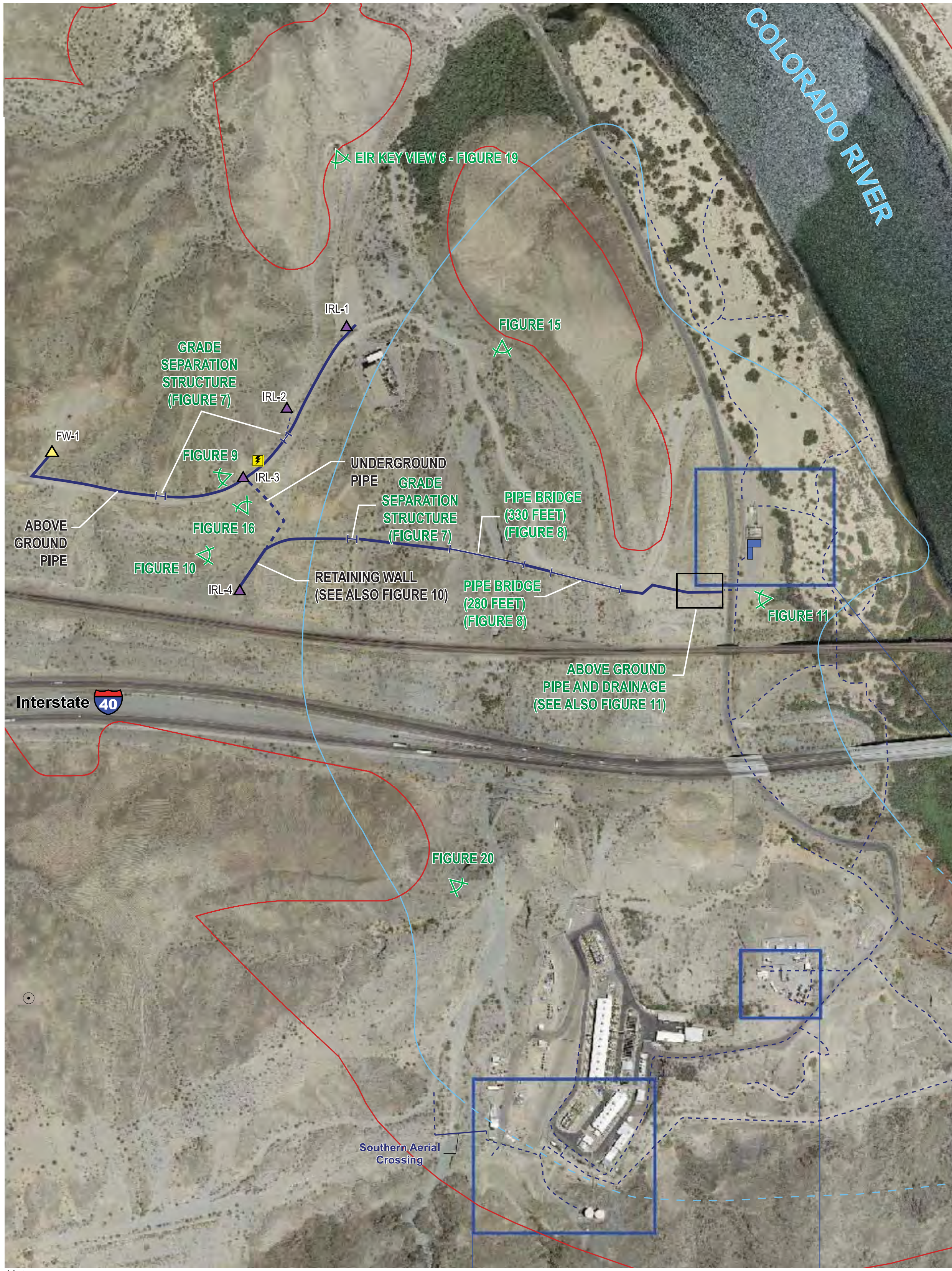
- Evaluate the feasibility of a subsurface bore, suggested by Curt Russell in the November 19-20 TWG meeting, at the eastern end of the alignment, where the Alternative A/H Route 2 pipeline segment meets National Trails Highway. This would eliminate the need for the staircase feature illustrated in Figure 11 of the above-referenced visual simulations.
- Evaluate the feasibility of locating IRL-2 in the center of the roadway, with buried vaults, to avoid intrusion into culturally-sensitive areas or major slope excavation. The roadway would need to be periodically closed for maintenance on the well or related buried infrastructure, but it would still be possible to access other project and IM-3 facilities from the east or west.
- Evaluate the feasibility of using simpler pipe bridges supported in a manner similar to the existing large-diameter Southern California high pressure gas pipeline Bat Cave Wash crossing shown in Figure 13 of the above-referenced visual simulations. Another possibility might be to suspend the pipes from a steel cable, possibly with support/stabilization at points along the ground. The objective would be to minimize the complexity, footprint, cost, maintenance, etc., of the currently-proposed pipe bridge structures. In this scenario, maintenance for the remedy infrastructure would be done in a manner similar to what is presumably presently done for the large-diameter Southern California high pressure gas pipe where it crosses valleys and washes.
- For the portion of the alignment in the area of the shorter of the two proposed pipe bridges, evaluate the feasibility of placing the pipeline above-ground, but without using a pipe bridge.
- Evaluate the feasibility of substituting underground crossings in place of the above-ground grade separation structures, shown in Figure 7 of the above-referenced visual simulations, at all other locations where above-ground grade separation structures are required.
- Evaluate the feasibility of alternative methods of slope support in the area of IRL-4. Alternatives would include shotcrete (sprayed on mixture of sand, cement, fine gravel and water) or sand-cement bags – tinted to match the surroundings. The recent Cost-Effective and Sustainable Road

Slope Stabilization and Erosion Control synthesis by NCHRP (National Co-Operative Highway Research Program) may offer applicable solutions, though bio-engineered methods are probably not applicable in the desert setting of Topock. The simpler the better. The objective would be to minimize the complexity, footprint, visual impact, cost and maintenance of the slope support.

- Evaluate the feasibility of a temporary vehicular closure to the public of what is often referred to as "Route 66" between Park Moabi road and the IM-3/IRL-1 location, for the duration of the project. The road would have locked gates at either end, and be closed to public motorized vehicular traffic, but not closed to public pedestrian access. BLM, PG&E, San Bernardino County Fire Department, the Fort Mojave Indian Tribe and possibly other parties would have gate keys to access the road for their specific needs. If there is no public vehicular access, then the need for guardrail may be eliminated. NOTE: It is very likely, that, from a San Bernardino County point of view, this road is already in a substandard condition: in places, it is only one lane in width, and, in other places, there are drop-offs.
- Evaluate the feasibility of minimizing or eliminating the use of double-contained (dual-wall) water line piping for above-ground portions of the pipelines. If there is a leak, won't it be visible during routine inspections?
- Evaluate the feasibility of using smaller-diameter pipe for above-ground portions of the pipeline in general, and for pipe bridges in particular – to reduce the weight of the pipeline. For the pipe bridges, the friction losses would be higher but the length of pipe is relatively small.
- Evaluate the feasibility of placing above-ground piping closer to the ground to reduced design moments and thus reduce the required support and foundation sizes.
- Evaluate the feasibility of designing the pipeline to have suitable wildlife crossings. For example, above-ground pipeline segment could periodically dive underground for a lateral distance of 5 or 10 feet.
- Evaluate the feasibility of placing all of pipeline segment H above ground.
- Utilize above-ground electrical, fiber-optic and telecommunication utilities per Figure 5 of the above-referenced visual simulations.

Pipeline Segment B

We recommend Pipeline Alternative B0A (Figure 21 of the above-identified visual simulations).



Notes: 1.Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. See Figure 5 for Overhead Electical.

LEGEND

- EIR Project Area
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (μg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Proposed Electrical Transformer Location

FIGURE 4
PIPELINES A/H ALTERNATIVE ROUTE 2 (ALTERNATIVE 2)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

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CH2MHILL.

Discussion regarding “Segment 1 – Pipeline A”

Slope access from NTH up to south end of mesa

Segment 1 Pipeline A: Slope access vs. original 60% BOD route along access road thru Locus B

Segment 1 Pipeline A: Location of slope access

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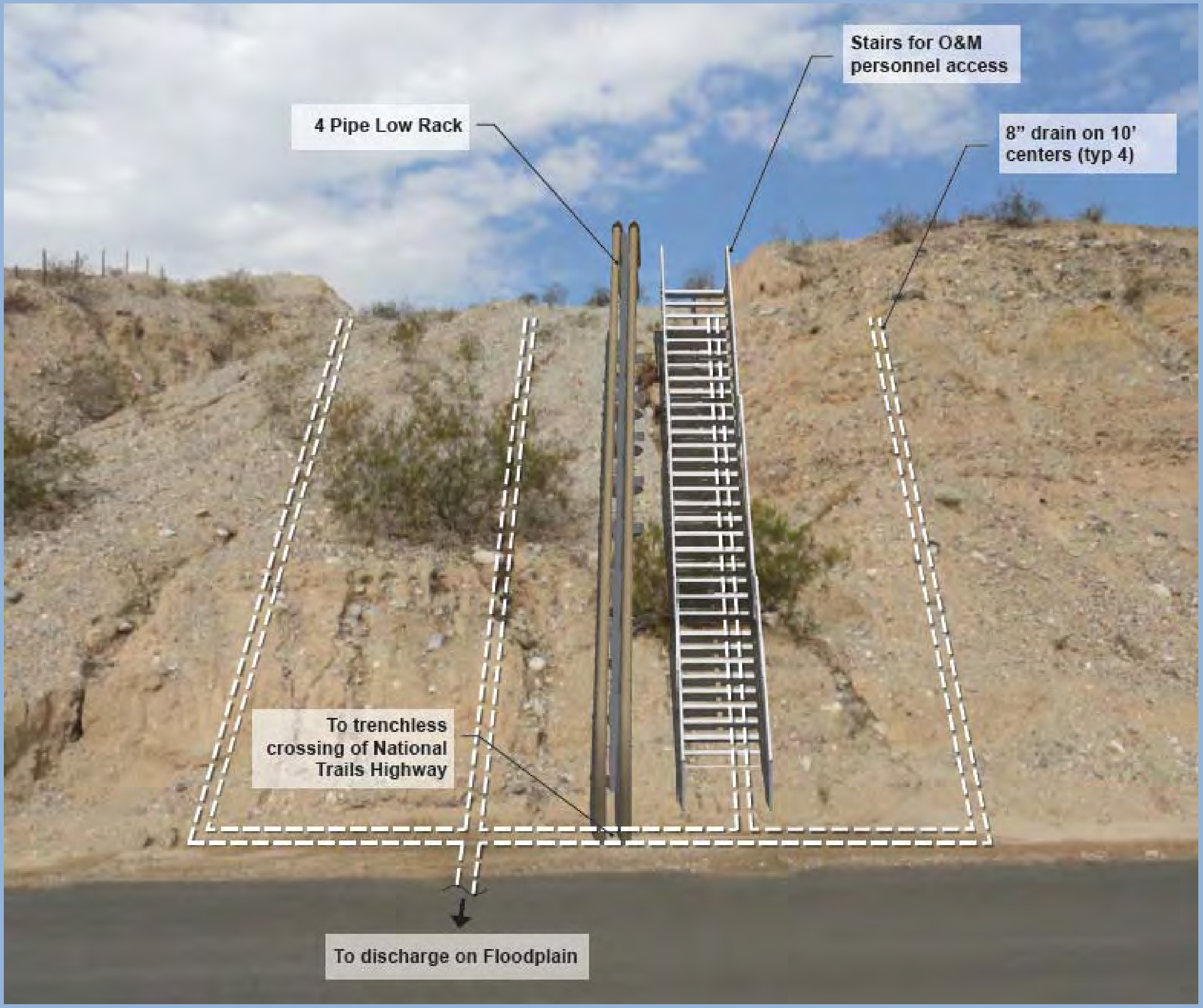

Simulation of possible above-ground structures

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Summary of Options for Segment 1- Pipeline A (slope access)

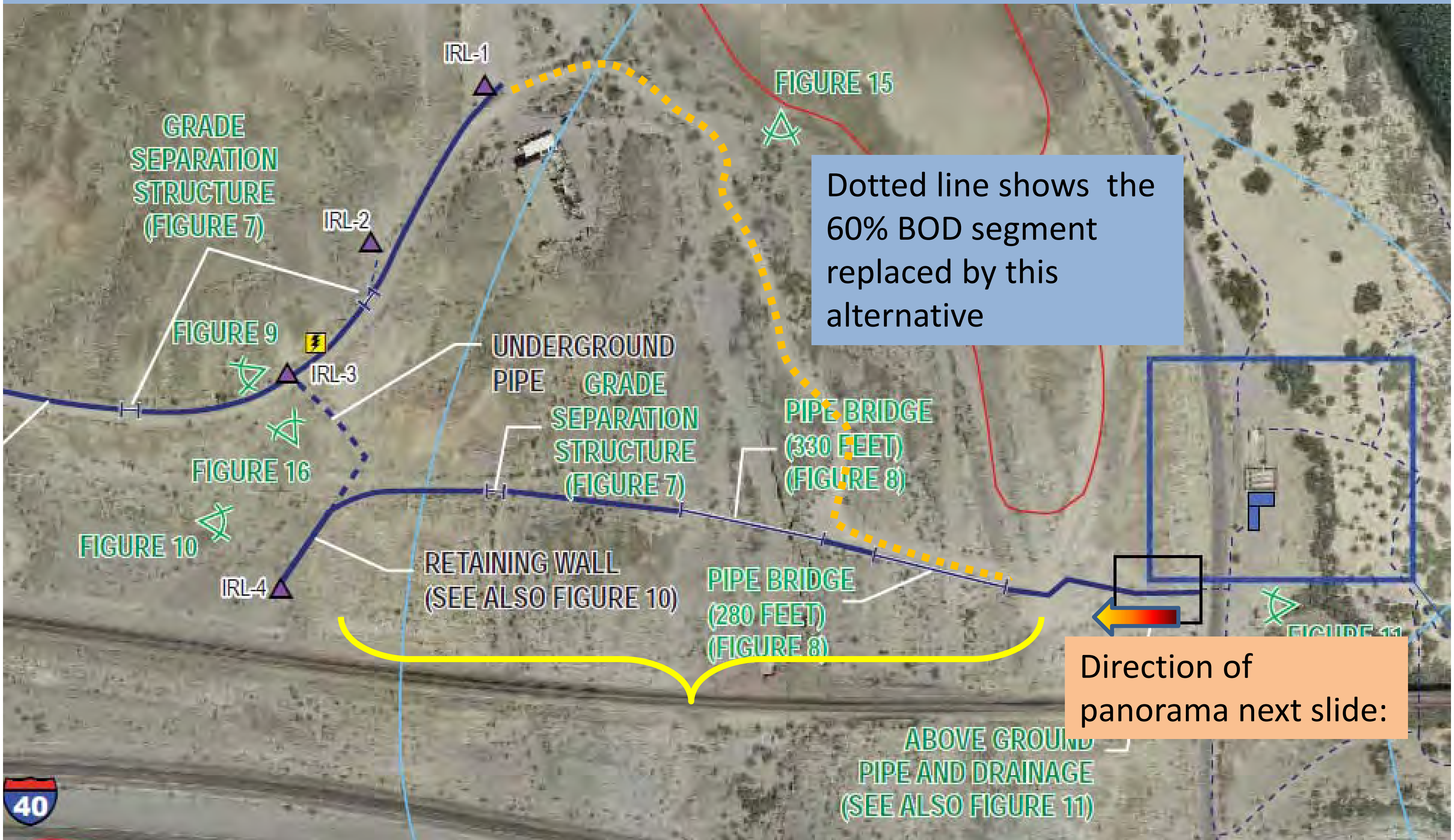
– Bring infrastructure up slope in a trench, adjacent to existing pipeline/easement.
– Bring infrastructure up slope on above ground supports, includes access stairway, pipeline supports, buried drainage pipes and basins; likely additional cut into slope on northern side to accommodate structures within existing pipeline easements.
– Underground “direct piping” bore from NTH to top of slope using tunnel boring machine (TBM). All piping and utilities would be run through permanent 42” casing. Casing is not removable.

Discussion regarding “Segment 4 – Pipeline A”

From top of slope access, across

Bat Cave Wash to IRL-4

Alternate Proposed Alignment



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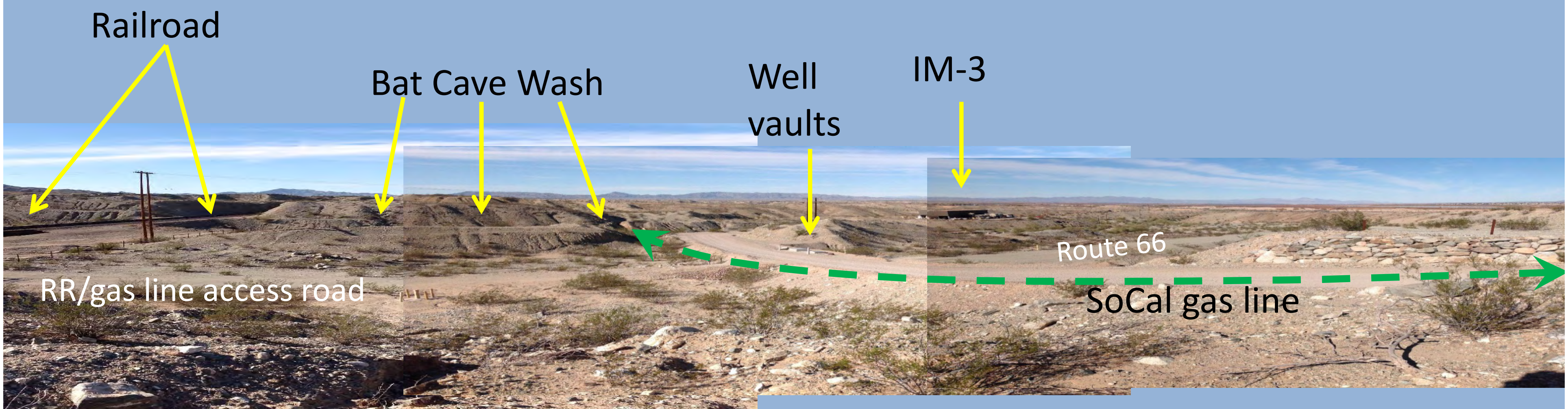
Tribal Option for Segment 4 Pipeline A
Panorama of Alternate Route

(view looking west from top of slope at SoCal pipeline easement)



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Existing SoCal gas line crossing over Bat Cave Wash

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Simulation of possible pipe bridge across Bat Cave Wash

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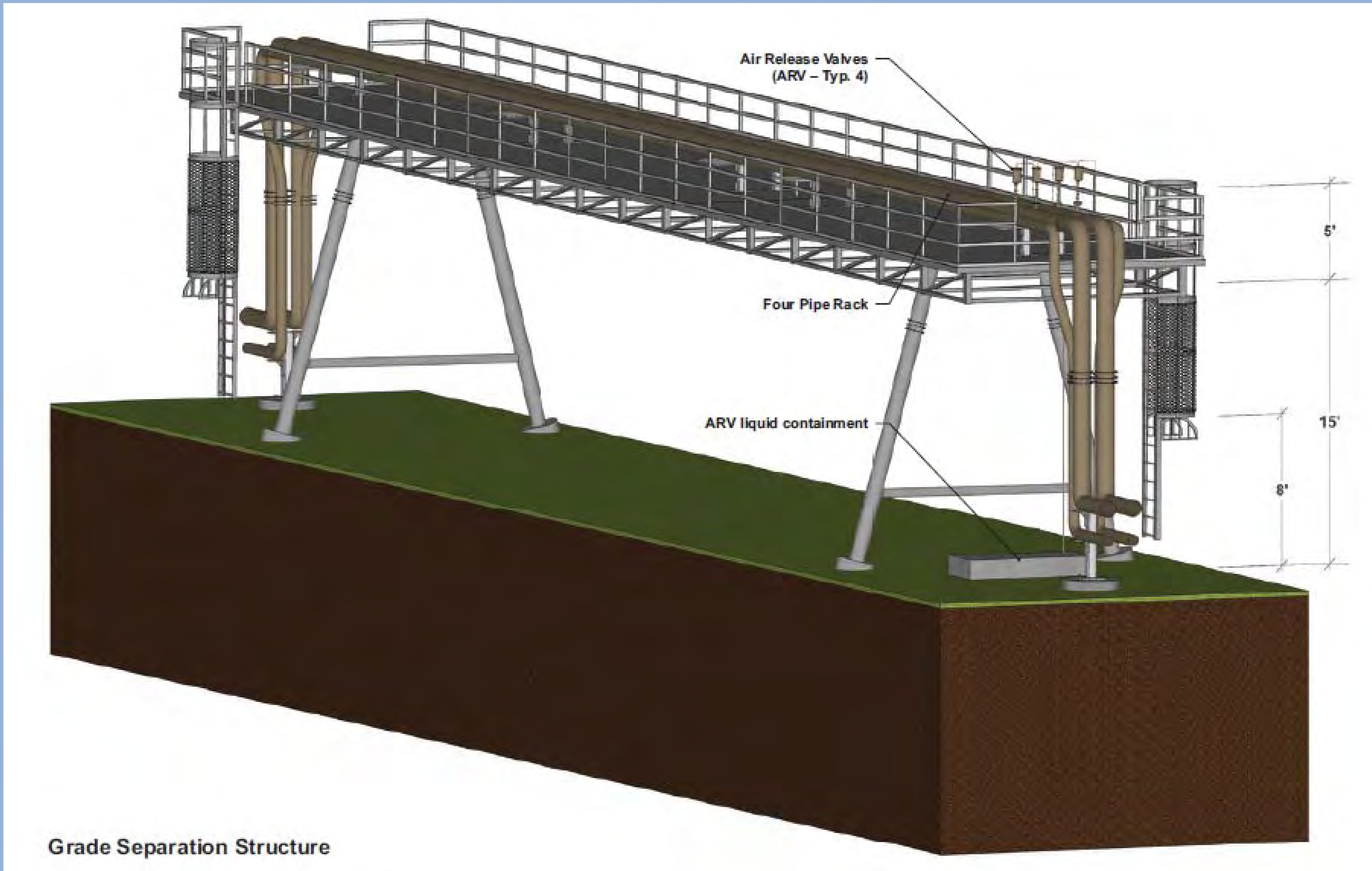

Simulation of possible grade separation over SoCal pipeline

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Simulation of possible view of pipe bridges and grade separation

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Possible considerations for this alternate routing (Segment 4):

- Two pipe bridge structures of ~330’ and ~280’ will extend above the top of Bat Cave Wash One grade separation structure to cross existing SoCal pipeline will also extend well above the land surface. These structures may be visible when viewed from the south Maze area.

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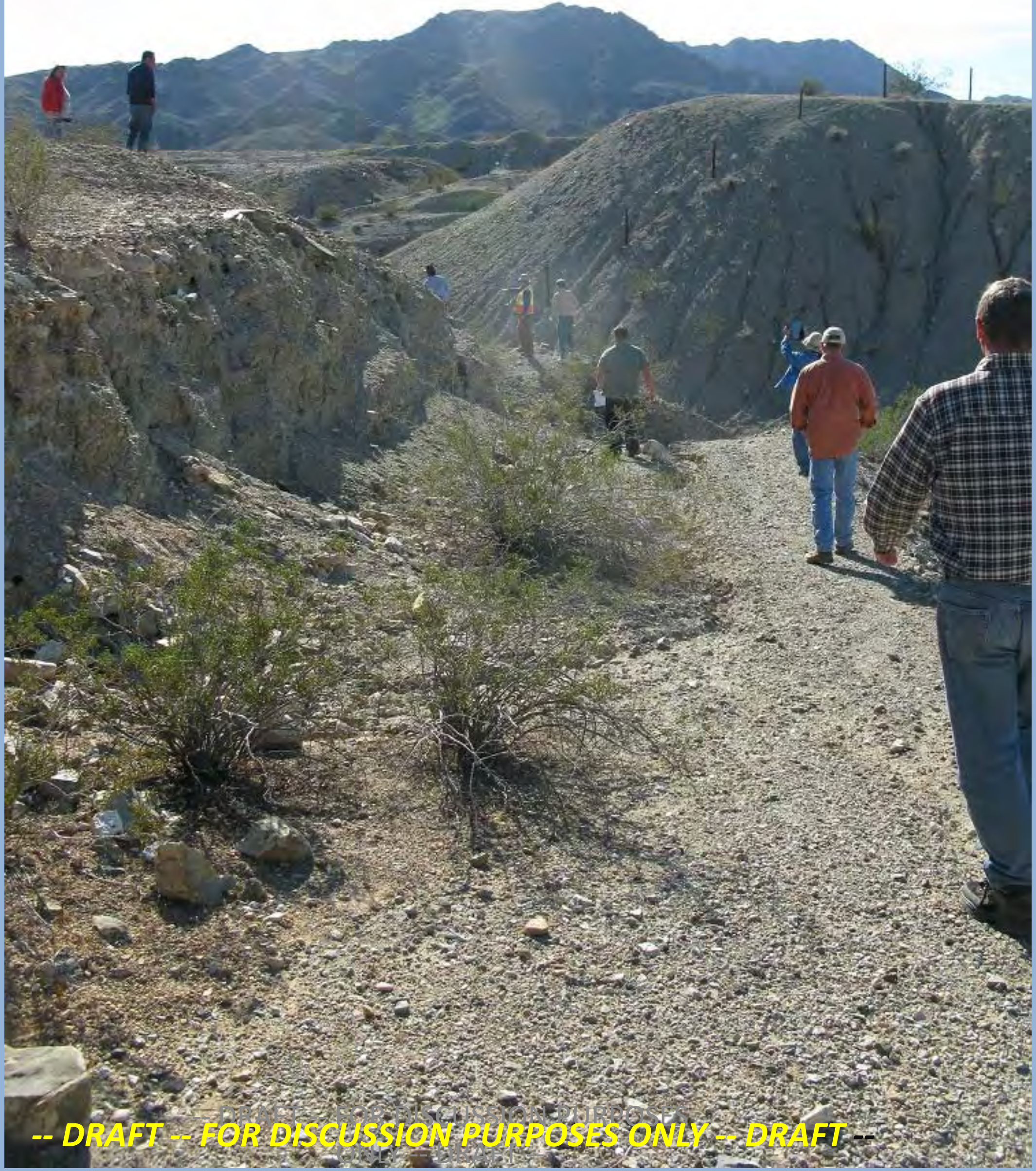
Discussion regarding “Pipeline H”

Access route from Route-66/IRL-3 down into to wash at IRL-4

Pipeline H (to IRL-4)

Pipeline H (to IRL-4)

Existing access road portion and bank cut along IRL-4 access route



Simulation of proposed retaining wall along existing bank down to IRL-4

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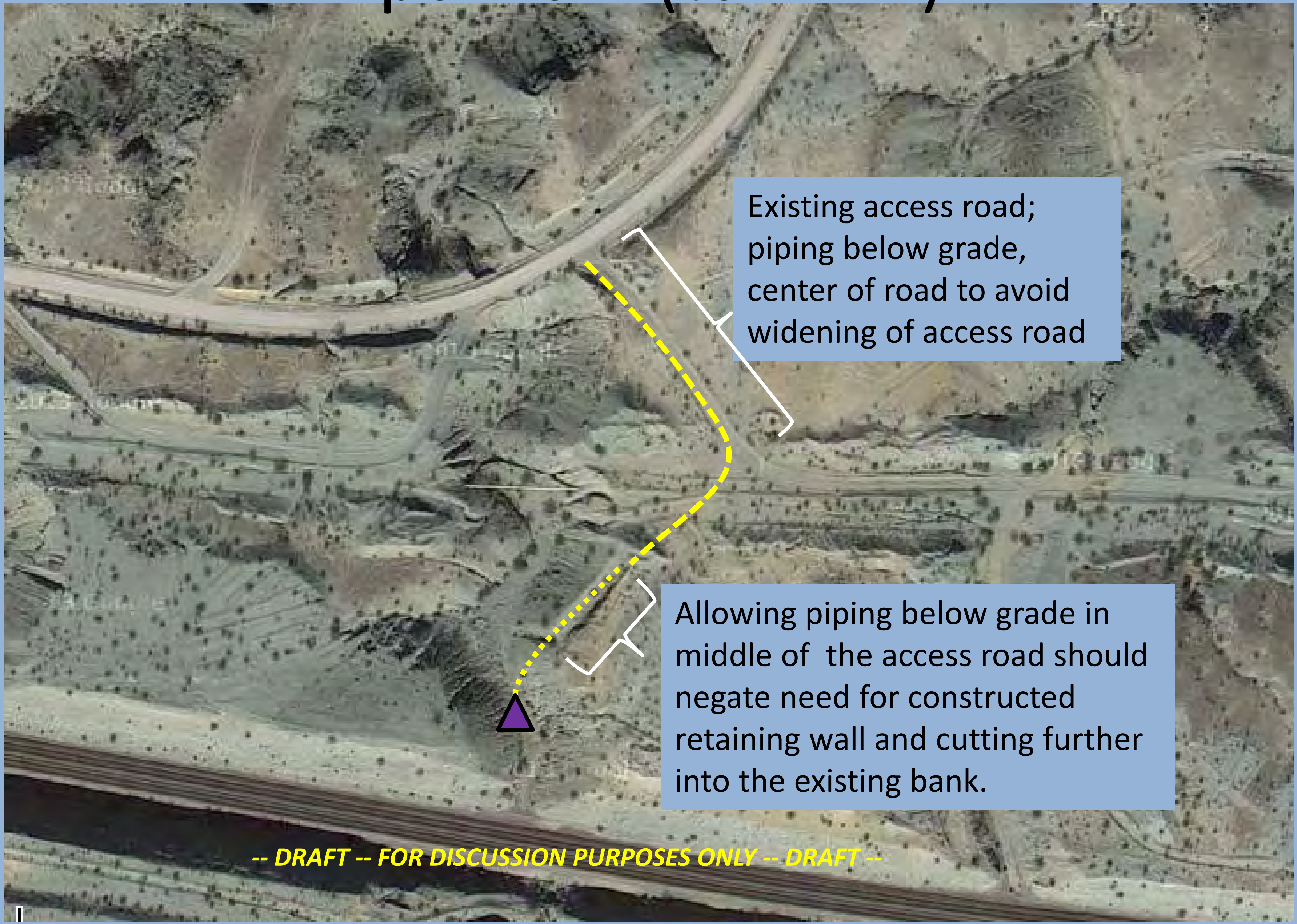
Pipeline H (to IRL-4)



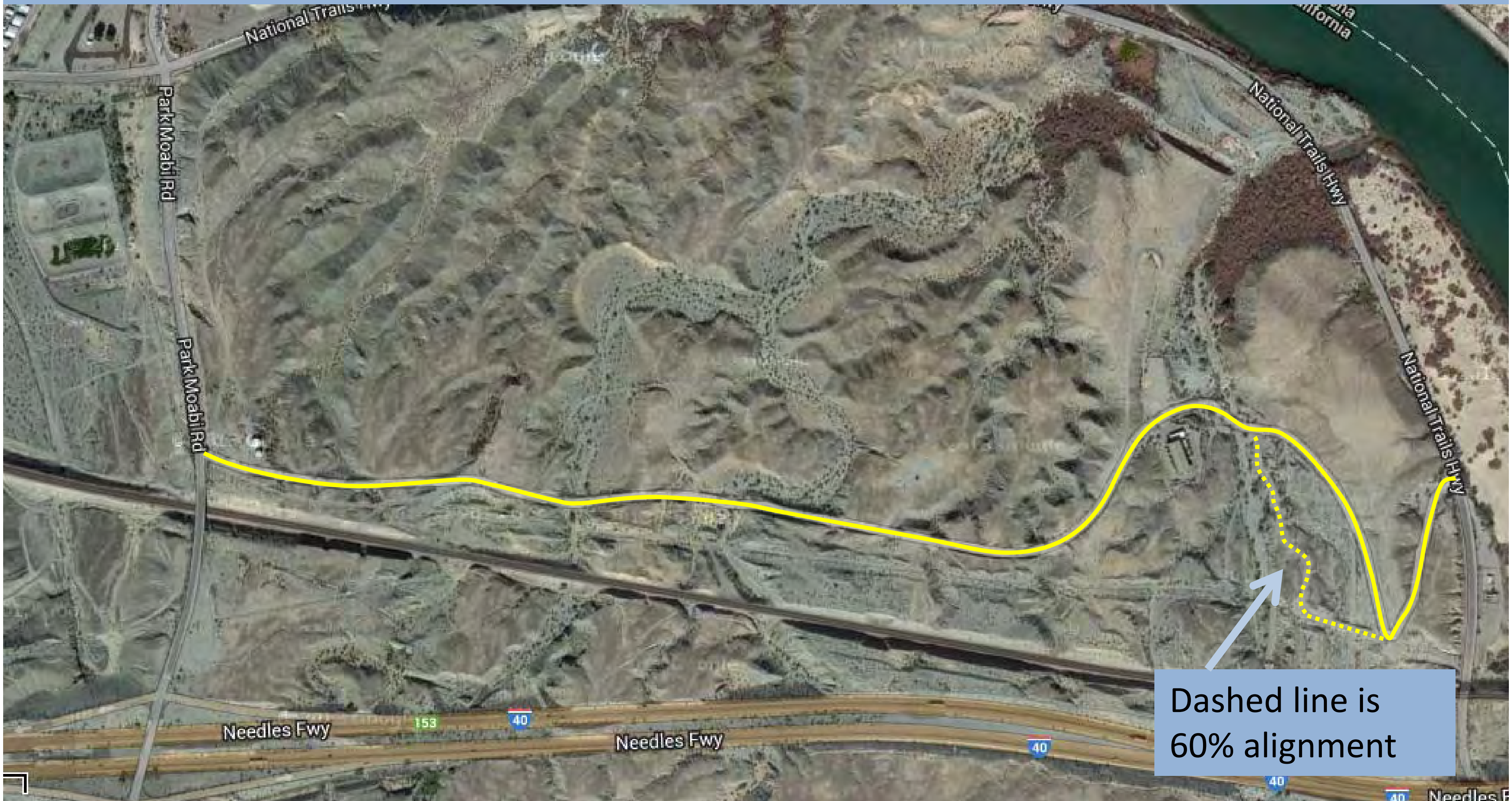
Summary of Options for Pipeline H – access to IRL-4

- Existing access road is narrow. Installation of piping to IRL-4 within the center of existing access road should prevent encroachment of the road width into the adjacent landscape.
- Any construction of remaining access road down into wash to IRL-4 should be done along existing pathway using fill only.
- If piping running down to IRL-4 is located within the roadway, this should avoid construction of retaining wall, and minimize width of access and additional encroachment into existing bank.

Discussion regarding Segment 3 – Pipeline A

Route 66 from FW-1 to IRL-1

Discussion re Route 66 width/access



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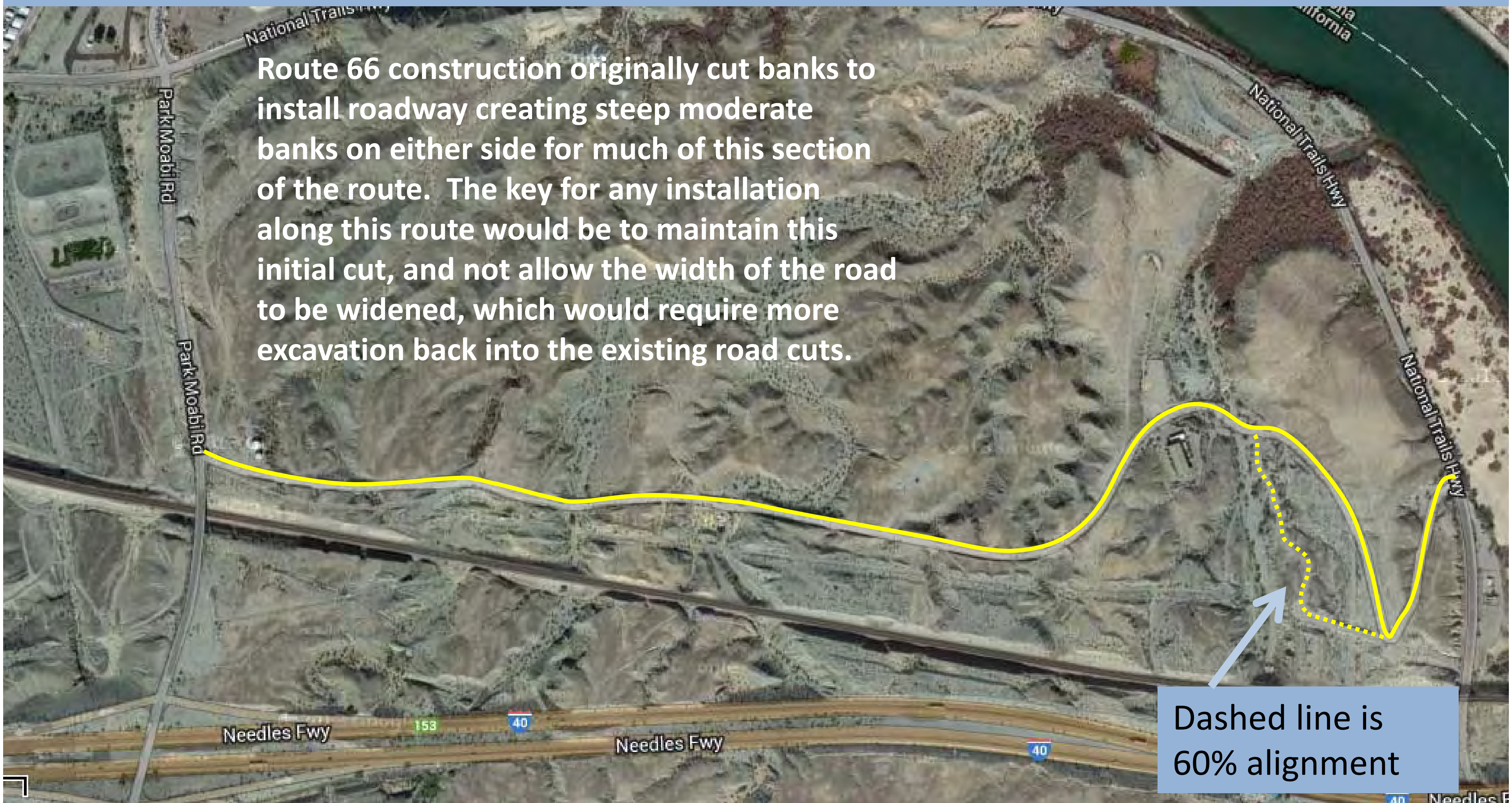
Segment 3
Pipeline A
GRADE SEPARATION STRUCTURE (FIGURE 7)
IRL-1
IRL-2
IRL-3
IRL-4
FW-1
ABOVE GROUND PIPE
UNDERGROUND PIPE
FIGURE 16
FIGURE 10
RETAINING WALL

Discussion re Route 66 width/access



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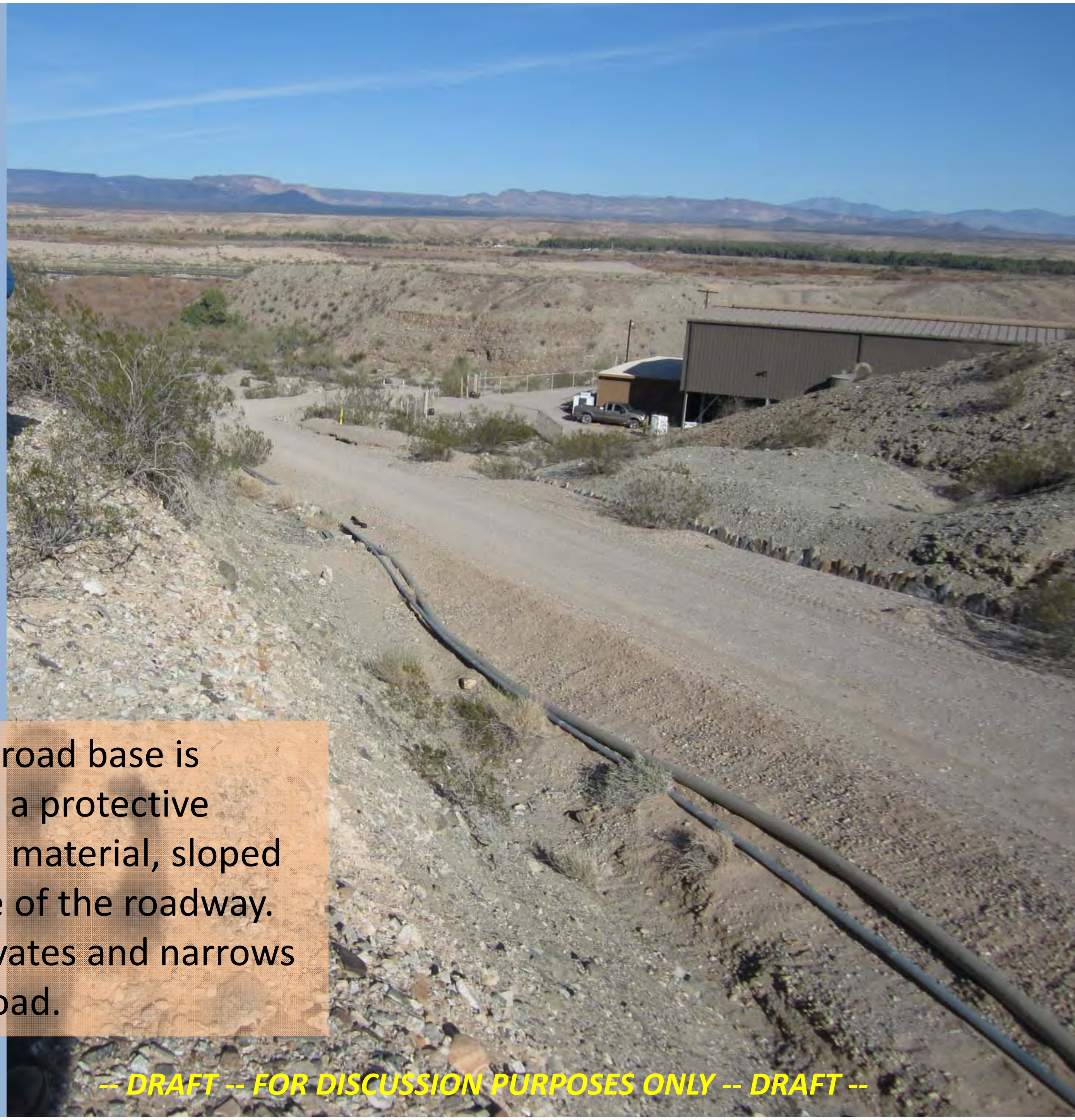
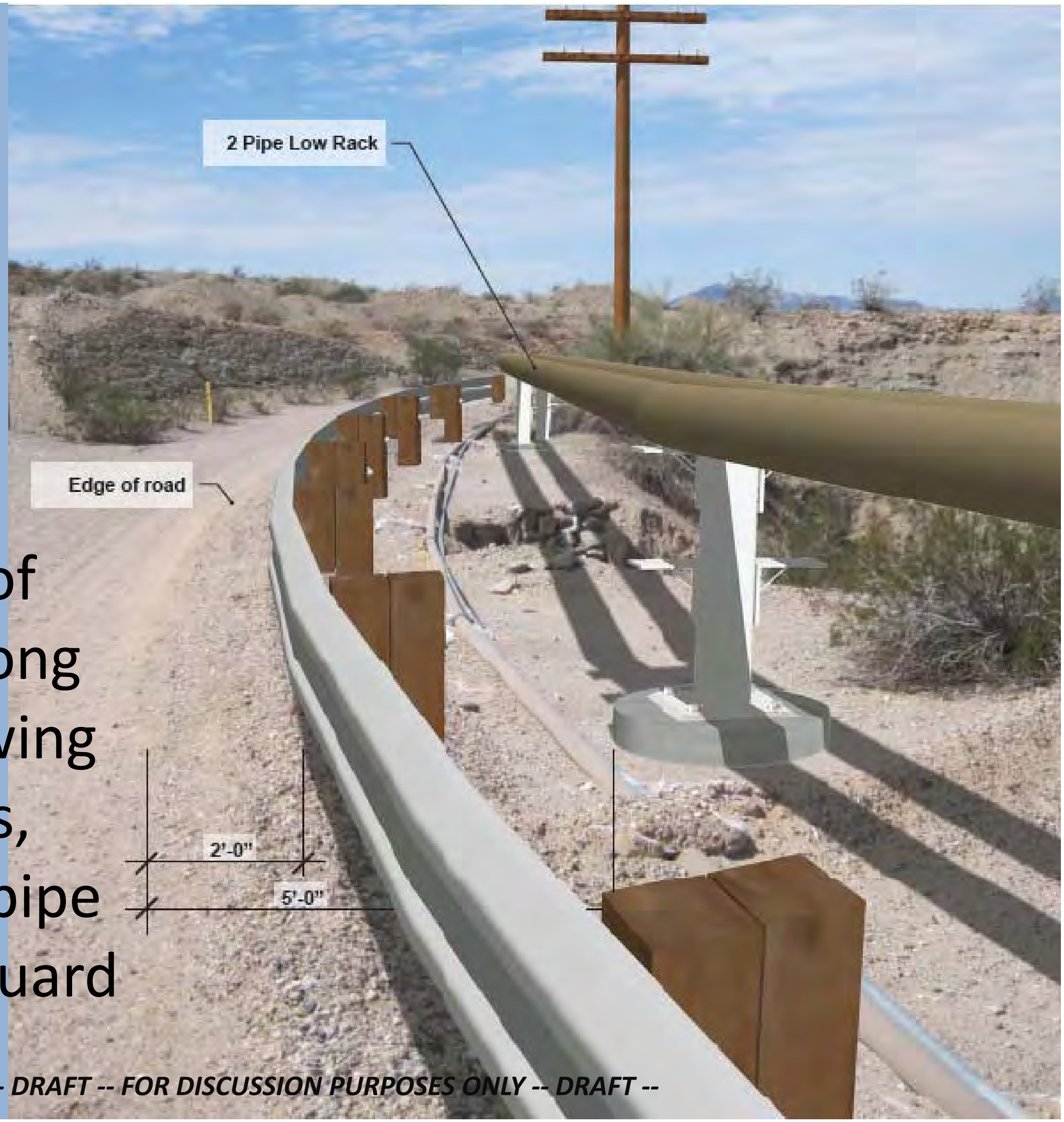


Note original road base is covered with a protective textile and fill material, sloped on either side of the roadway. This both elevates and narrows the original road.

Simulation of Segment 3 along Route 66 showing power poles, aboveground pipe supports and guard railing



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Discussion re Route 66 width/access

In order to limit the potential for bank widening as a result of installing above ground piping along Route 66 between IM-3 and FW-1, options are to:

1) CLOSE the section between IM3 and Park Moabi road. Locked gate at each end, utility crews would need keys for access to existing pipeline(s) installed along south side of roadway.

2) Make the section between IM-3 and Park Moabi road ONE-WAY only. This would negate requirement to widen road to maintain 2-way access along the above ground piping.

COMMENT RESOLUTION PIPELINE SECTIONS A/H: ALTERNATIVE ROUTINGS & COMPONENT DESIGNS
BASIS OF DESIGN REPORT - INTERMEDIATE (60%) DESIGN
PG&E Topock Compressor Station, Needles, California

TECHNICAL COMMENTS OF THE TRIBAL TECHNICAL REVIEW TEAM

PURPOSE

This evaluation has been prepared for tribal consideration and discussion. If there is a consensus among the Tribal representatives that alternatives developed as part of this approach are preferred over corresponding components of the 60% design submittal by PG&E, then the Tribes may want to propose any or all of the recommended alternatives to the TWG.

CONTEXT

This evaluation is based primarily on technical and engineering reviews of the 60% BOD. Additionally there have been several site walks and discussions during the 60% design review and comment period during which the Tribes' technical review team has had the opportunity to view features in the field and to discuss issues with Tribal representatives and form overall impressions. Still, the Tribes' technical reviewers cannot speak to or fully understand the spiritual and cultural impacts of the proposed project. Nevertheless, the reviewers have endeavored to summarize the physical impacts that would be associated with construction of various design options. In particular, the team has noted that the Tribes seem to prefer designs that, to the extent practicable, a) preserve existing natural materials in-place, and b) avoid specific culturally significant areas. In a broader sense, the team understands that the Topock site is, in its entirety, a sacred landscape within the Mojave Valley. This evaluation attempts to emphasize both of these two considerations.

SCOPE

This evaluation provides a design process and design criteria that PG&E should use while developing the 90% design for pipeline sections A & H. Additionally, this evaluation provides analysis of alternative pipeline and electrical infrastructure routings for pipeline Sections identified in the 60% BOD report and design drawings. Alternative routings are presented for Pipeline Sections A and H. Analysis is presented for four segments of Pipeline A, and for Pipeline H:

- Segment 1 Pipeline A (See Figure): MW-20 Bench to Access Road routed parallel to Southwest Gas Pipeline easement north side (600 feet long)
- Segment 2 Pipeline A (See Figure): Access Road to IM-3 Plant along 60% BOD Report alignment
- Segment 3 Pipeline A (See Figure): 60% BOD Report alignment from IM-3 Plant to FW-1
- Segment 4 Pipeline A (See Figure): Alternative II TRC Routing Memo Access Road to IRL-4 Branch Pipeline H
- Pipeline H (See Figure): 60% BOD Report alignment from Pipeline A to IRL-4

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DESIGN PROCESS AND CRITERIA FOR PIPELINE SECTIONS A & H

Continuing through the present time, stakeholder and particularly Tribal input to the project design has been reactive, rather than collaborative. That is, one party does something and the other reacts. Then, the other party then counter-reacts. This continues until an agreement or impasse is reached. Thus, the process largely becomes piece-meal. Consider that, while the status of the project is being reported as 60% (intermediate design), the potential for having to reroute pipelines with all the attendant considerations of above- vs. below-ground, clearing rights of way, etc. essentially reverts the design to a significantly lesser completion status. To improve this process, it would be better if PG&E would engage in an ongoing collaborative dialogue during preparation of the 90% design. Specifically, we recommend an alternative collaborative approach for pipeline sections A & H, as well as for related infrastructure served by those pipeline sections, e.g., IRL-1 thru IRL-4 and monitoring wells in the vicinity. Basically, this would be a separate process from the current Response to Comment (RTC) process which by design is simply reactive. Not having upfront Tribal involvement in the actual ongoing design decisions is inefficient and unlikely to achieve reasonable resolution of the issues. During collaboration, the respective parties would sit down together in a facilitated setting and discuss the options and jointly craft the parameters of the design. This collaboration should include the agencies throughout the process .

With the above in mind, we recommend the following design criteria for pipeline sections A & H. These criteria should be applied to each and every system and subsystem for pipeline sections A & H.

- Minimize excavation, disturbances, and visual impacts, with areas of greatest sensitivity identified as cultural and spiritual areas identified by Tribes.

Examples of minimization might include but are not limited to:

- Where above-ground power is used, select line routing to minimize access roads, e.g., by installing poles at the margins of existing roadways, so that the poles can be installed and maintained with no need for access roads to minimize further encroachment into the landscape.
- If wells and related infrastructure can be installed in the middle of an existing roadway, that is preferable to constructing new access roads (e.g., IRL-2).
- If small changes in well locations lead to reduced excavation or area of disturbance, make those changes.
- Minimizing infrastructure on the upper mesa areas avoids proximity to culturally sensitive areas as well as visibility from these places of significance.

Segment 1 Pipeline A

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Options for bringing piping up the slope alongside the existing large-diameter high-pressure Southern California gas pipeline are discussed below. This routing avoids the culturally sensitive area on the south end of Locus B.

Options for Segment 1 Pipeline A

A) Install water piping and electrical on slope, in a buried trench along north side of existing gas line trench	B) Install water piping and electrical on slope, above ground	C) Install piping within 36-42" pipe installed using "direct piping" methods
Structural components include: A1) Concrete boxes at base of embankment, top of embankment for valves, electrical pull boxes. A2) Pipeline and electrical trenches approximately 8.5 wide depth 4 to 6 feet A3) Electrical trench will include red concrete encasement around the high voltage line (approximately 1/2-foot by 1-foot). A4) drainage structures and erosion control may be required over and around vaults and structures. The burial depth would depend on detailed engineering of the slope to provide stable slope and minimize potential for pipe exposure.	Structural components include: B1) <u>structural pipe supports</u> (concrete footings ~10' deep into slope were suggested by CH_2MHill during the 12/27 site walk). With a slope length of approximately 200 lineal feet, supports will be required every 20 feet. B2) <u>access stairway</u> alongside aboveground pipes to allow maintenance and access to piping. Platforms every 40 feet. B3) <u>Drainage structures including:</u> basin/structure at the top of the slope to collect runoff, divert to buried pipes alongside structure, beneath NTH, and to culvert/erosion basin on flood plain B4) Vaults would be needed at either end. B5) discussion on 12/27 site walk indicated that this overall approach would likely require <u>additional cutting into slope on north side of gas line easement</u> in order to fit pipe supports, drainage structures, and access stairway <u>outside of</u> existing gas line easement. B5) Installation of ~40-foot power poles on 100 feet centers going up slope B6) Installation of pipe 2 boxes for Southwest Gas Pipeline Crossing.	Note this is a relatively new method for installing trenchless conduits. This method has been used in only a few projects so far in the US, it has been utilized mainly in Europe. it has not been confirmed with the contractors who do this type of work would be willing to bid on this particular job. (Note: traditional directional drilling does not appear possible due to cobbles & boulders, and the unconsolidated nature of geologic materials in this area.)

Range of estimated soil removed for trenching: Given the assumption of 600 lineal feet and 8.5 feet wide and an average excavation depth of 4 to 6 feet assumptions, <u>potential range of disturbed earth may range between 750 to 1130 cubic yards.</u>	Range of estimated soil removed for approximately 600 lineal feet (200 ft. of slope and an additional 400 ft. to the west of the top of the slope). Footings for structural pipe supports: <u>40 cubic yards</u> Footings for stairway support: Assuming for 4 concrete piers per platform and 2 supports between platform: <u>50 cubic yards</u> Trenching/installation of drainage basin/pipes: <u>80 cubic yards</u> Additional Trenching/installation of drainage beneath NTH, to storm water basin on flood plain: <u>~100 cu yds.</u> Potential excavation into side of existing notch, into in-place bank soils to provide additional room for structures assuming 5 feet width and 3 foot of depth for 200 lineal feet: 110 cubic yards. Total estimated soil excavation: <u>280 cubic yards</u>	Assuming beginning in the flood plain and boring beneath NTH and the existing slope/gas lines and daylighting beyond the top of the slope, approximately 400 west of the top of slope; <u>assuming 42" piping conduit installed: 220 cubic yards</u> The work areas required for mobilization and construction of the 42" conduit would be quite large and damaging, as use of a tunnel boring machine (TBM) requires extensive work area to lay out the equipment and drill string. These drilling cuttings would be mixed with some sort of drilling fluid, so would not be able to be reused on site, at least not without further dewatering, and possible other processing.
Removal/Demo issues: Trench could be dug out to remove piping – either for repair or replacement during the project life, or for decommissioning.	Removal/Demo issues: <u>Above grade structures</u> such as stairway, pipe supports and piping could be removed. <u>Deep concrete footings</u> for these structures could be excavated and removed, but it would be difficult achieve structurally stable soil compacting in the excavations to prevent erosion. <u>Buried drainage pipes</u> could be excavated and removed.	Removal/Demo issues: Once installed, the outer 36-42"casing installed using this method could NOT be removed. Piping running inside the casing could be pulled out for repair, replacement or decommissioning.

SUMMARY EVALUATION for SEGMENT 1, PIPELINE A : These options to the PG&E 60% BOD Report approach offer positive modifications which help avoid specific areas, reduce the length of the infrastructure and overall excavation volume, and avoid much of the upper mesa that would have been traversed for implementation of the original 60% BOD Report approach. One issue that needs to be resolved is that of the right of way associated with the existing gas pipeline. This would determine whether the new pipelines could be placed within the area of the existing disturbance or whether they need to be moved further north into areas where soils have not been previously disturbed.

Option C (direct piping) is not considered viable because it introduces a large, permanent disturbance to the subsurface at the site. In addition, mobilization and work areas required for the construction of the 42" conduit could be quite large and damaging. Also, there is considerable uncertainty associated with viability of this option.

Analysis of the volumes of potentially excavated soils suggests that, although the stairway, pipe rack and drainage (Option B) would create a lot of disturbance, it would still result in a lesser volume of disturbed soil than required to construct the large trench needed piping and electrical. This seems to stay true even if up to 5-feet of the existing bank needs to be cut into to widen existing gas pipeline easement notch. Even if the side bank excavation needed to be wider, the massive dimensions of the anticipated trench (est. 7 to 8.5 feet wide, 4 to 6 feet in depth) still makes the above-grade scenario the lesser of the two with respect to volume of natural soils that would need to be removed. The Tribes may wish to also take into consideration issues related to the potential nuisance associated with public access to the mesa area adjacent to Locus B. The Tribes may wish to recommend omitting the proposed maintenance staircase in favor of alternative ways for personnel to inspect and maintain the pipes. This is supported by the fact that the purpose of the stairway access would primarily be for visual inspection. Significant or frequent "hands on" maintenance would presumably (and hopefully) not be required.

Note that for the segments where there is electrical, this may be conveyed in a trench with the rest of the piping if in a trench, or aboveground using telephone poles. One suggested alternative requires power to the segment between IRL-1 and IRL4 be provided by the City of Needles. The expressed desire of PG&E is that all power for the remedy be provided by the compressor station itself.

Options for Segment 2 Pipeline A (60% BOD Report Routing)		
A) Install Pipeline per 60-% BOD Report design approach Structural components include: A1) Pipeline and electrical trenches approximately 7 to 8.5 wide depth 3 to 4 feet per the basis of design report A2) Northern aerial crossing of Bat Cave Wash A3) Buried electrical lines [[A1=maximum excavation]] [[A2=B2=C2 (aerial crossing same for all]] Range of Excavation for trenching: [[10'*8.5'*4'= 12.6 cu yds 10'*7'*3'= 7.8 cu yds]]	**B) Install water piping below grade and electrical above-grade** Structural components include: B1) Pipeline trenches approximately 6 to 7 wide depth 3 to 4 feet per the basis of design report B2) Northern aerial crossing of Bat Cave Wash B3) Above grade electrical lines and control on poles ~40-foot power poles on average of 100 feet centers B4) Potential for access roads to power poles depending upon location. . The final specific spacing and location of power poles is highly relevant as it directly impacts disturbance related to installation and maintenance of the electric lines. [[B1=A1 LESS electrical trench volume, but adds unknown potential access roads and pole installation auger holes]] Range of Excavation for trenching for comparison: [[10'*7'*4'= 10.4 cu yds (~82% of A1 version) 10'*6'*3'=6.7 cu yds (~85% of A1 version)]]	**C) Install water piping and electrical above-grade. Install guard rail and grade separation structures** Structural components include: C1) structural pipe supports (concrete footings ~2' diameter 6' deep into based by CH2M conceptualizations) spaced 20 feet on center C2) Northern aerial crossing of Bat Cave Wash. C3) Above grade electrical lines and control on poles ~40-foot power poles on average of 100 feet centers C4) Potential for access roads to power poles depending upon location. C5) Installation of W-style guard rail; assumes post imbedded 4 feet every 6 feet.
Range of estimated soil removed for trenching: Given the assumption of 100 lineal feet and	Range of estimated soil removed for trenching and poles: Given the assumption of 100 lineal feet and 6	Range of estimated soil removed for guard rails, supports and poles: Given the assumption of 100 lineal feet:

8.5 feet wide and an average excavation depth of 3 to 4 feet assumption, potential disturbed earth would be 100 cubic yards per 100 feet of pipeline and electrical.	feet wide and an average excavation depth of 3.5 feet assumption, potential disturbed earth would be 70 cubic yards per 100 feet of pipeline and electrical. Disturbance associated with power poles would be less than a 0.2 cubic yards per pole, but does not include access roads for power poles. Aboveground electric lines also eliminates the need for red concrete trench liner mandated for buried electrical lines	Disturbance associated with power poles would be less than 0.2 cubic yards per pole, but this does not include access roads for power poles. Disturbance associated with pipe supports are 3.5 cubic yards per 100 feet. Disturbance associated with guard rail is 1 cubic yard per 100 lineal feet. Greater area may be need to be disturbed if road needs to be widened. [[Should note that a) this caveat may be significant, and b) likely that any road widening would cut into in-place roadside materials, c) closing the Route 66 segment to public traffic should reduce but may not eliminate the need for road widening]]

SUMMARY EVALUATION for SEGMENT 2, PIPELINE A : Above-ground electrical infrastructure would require a lower volume trench excavation, eliminate the need for red-concrete, as compared with the original 60% BOD. Nevertheless, the overall the trench excavation is massive for both Options A & B. If considering the amount of material excavated alone, the above-ground installation (Option C) is much less impactful than either trenching scenario. Other factors regarding the impacts of the above-ground scenario that should be considered by the Tribes include that the placement of power poles, above-ground pipe supports, guard rails, and multiple access roads (to power poles). Collectively, these could result in more encroachment onto the undisturbed landscape. The largest unknown factor will be the degree and location where the road may need to be widened to accommodate both vehicle traffic and the aboveground alignment of pipe supports, guard rail, and power poles.

Options for Segment 3 Pipeline A

A) Install Pipeline per 60% BOD Report	B) Install water piping below grade and electrical above-grade	C) Install water piping and electrical above-grade. Install guard rail and grade breaks.
Structural components include: A1) Pipeline and electrical trenches approximately 7 to 8.5 wide depth 3 to 4 feet per the 60% BOD Report A2) Buried electrical lines Range of Excavation for trenching: [[10'*8.5'*4'= 12.6 cu yds 10'*7'*3'= 7.8 cu yds]]	Structural components include: B1) Pipeline trenches approximately 6 to 7 wide depth 3 to 4 feet per the basis of design report B2) Above grade electrical lines and control on poles ~40-foot power poles on average of 100 feet centers. The final, specific spacing and location of power poles is highly relevant as it directly impacts disturbance related to installation and maintenance of the electric lines. B3) Potential for access roads to power poles depending upon location Range of Excavation for trenching for comparison: [[10'*7'*4'= 10.4 cu yds (~82% of A1 version) 10'*6'*3'=6.7 cu yds (~85% of A1 version)]]	Structural components include: C1) <u>structural pipe supports</u> (concrete footings ~2' diameter 6' deep into based by CH2M conceptualizations) spaced 20 feet on center C2) Above grade electrical lines and control on poles ~40-foot power poles on average of 100 feet centers C3) Potential for access roads to power poles depending upon location. C4) Two grade separation structures for access across pipeline (could be above or below grade. Above grade would require pipe bridge for vehicle access across. Below grade would include two pipe vaults and underground trench between vaults) C5) Installation of W style guard rail; assumes post imbedded 4 feet every 6 feet. Road widening could result from detailed engineering of guard rail system and additional area of disturbance.
Range of estimated soil removed for trenching: Given the assumption of 100 lineal feet and 8.5 feet wide and an average excavation depth of 3 to 4 feet assumption, potential disturbed earth would be 100 cubic yards per 100 feet of pipeline and electrical.	Range of estimated soil removed for trenching and poles Given the assumption of 100 lineal feet and 6 feet wide and an average excavation depth of 3.5 feet assumption, potential disturbed earth would be 70 cubic yards per 100 feet of pipeline and electrical. Disturbance associated with power poles would be less than a 0.2 cubic yards per pole, but does not	Range of estimated soil removed for trenching and poles Range of estimated soil removed for guard rails, supports and poles Given the assumption of 100 lineal feet. Disturbance associated with power poles would be less than a 0.2 cubic yards per pole, but does not include access roads for power poles. Disturbance associated with pipe

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	include access roads for power poles.	supports are 3.5 cubic yards per 100 feet. Disturbance associated with guard rail is 1 cubic yard per 100 lineal feet. Greater area may be need to be disturbed if road needs to be widened.
Removal/Demo issues: Above grade structures panels could be removed. Buried pipes and electrical conduit could be excavated and removed. Area would need to be backfilled with appropriate material. Dyed concrete would require removal.	Removal/Demo issues: Above grade structures panels, power poles could be removed. Buried pipes and pole footings could be excavated and removed. Area would need to be backfilled with appropriate material	Removal/Demo issues: Above grade structures panels, pipe, pipe supports, power poles, and guard rails could be removed. Pipe support and pole footings could be excavated and removed. Area would need to be backfilled with appropriate material

SUMMARY EVALUATION for SEGMENT 3, PIPELINE A: Although above-ground electrical infrastructure would result in a lower volume trench excavation, eliminate the need for red-concrete, overall, the trench excavation is massive for both Options A & B. If considering the amount of material excavated for trenching alone, the above-ground installation (Option C) appears much less impactful than either trenching scenario.

However, this section of Route 66 is generally narrow, and in many places bordered by a drop off, or a several-foot high cut slope/embankment. These features were likely created when the original Route 66 roadway was cut into the landscape. Therefore, along this segment, the width of the roadway is constrained on both sides by topographic changes, and also by the buried relatively small-diameter Southwest Gas pipeline which runs along the south side of the road. The present width of the roadway is probably narrower than the original roadways as a result of the emplacement of the thick layer of aggregate that PG&E has placed on top of the road to protect the road bed.

To allow for the installation of above-ground pipes and protective guard rails, PG&E has stated that, along some portions of this segment, the road must be widened to allow for the above-ground infrastructure in conjunction with 2-way public traffic. It has been indicated that this would be required by the County of San Bernardino since this is a "public road." Unfortunately, the degree to which additional slope cuts would be necessitated to accommodate above ground piping has not been evaluated since this alternative was not part of the 60% design. Any expansion of the original roadway cuts could result in large volumes of native materials being excavated, and also significant changes in the topography along the roadway. This represents the largest unknown factor since there is no specific design to indicate the degree and location where the road may need to be widened to accommodate both vehicle traffic and the aboveground alignment of pipe supports, guard rail, and power poles.

Other factors that the tribes may wish to consider regarding the impacts of the above-ground scenario include that the placement of power poles, above-ground pipe supports, guard rails, and multiple access roads (to power poles) could collectively result in more encroachment onto the undisturbed landscape.

It may be difficult for the Tribes to be able to weigh the various options when there remains so much uncertainty as far as how a given option will be implemented at this point in time. However, it may be possible to provide a set of construction and/or design constraints which could be used to move the design forward along this segment, while limiting potential damage:

- Since additional slope cuts would be required, mainly due to road width requirements, anything that would reduce the required width could also limit further potential road cuts. There have been two suggestions, 1) to close this road from just west/south of IM-3 out to Park Moabi road. This would mean locked gates at each end. PG&E voiced significant concerns regarding access to this route as there are various maintenance crews which inspect/work on the gas lines and require access. This may be addressed by an automated gate such that any service crews would need to get out of the vehicle to lock or unlock the gate. 2) a simpler suggestion may be to simply make this road 1-way from IM-3 out to Park Moabi road. This should result in a narrower road width requirement, which could hopefully mean little or no additional road cuts in the existing slopes.
- The Tribes could request that, when designing the short access roads, such as up to IRL-2, only fill material be used, and no additional excavation or road cuts be made to the extent possible.

Tribal Option for Segment 4 Pipeline A

A) Install water pipeline above-grade and electrical above-grade from top of slope at east end to pipeline section H; control via radio. (The route in the existing 60% BOD Report follows existing Route 66 alignment all the way out to NTH, bisecting the southern portion of Loci B, and the approach is to put everything underground.) Structural components include: A1) Concrete valve boxes (vaults) at underground crossings of gas lines or access roads. A2) Pipeline supports spaced on 20 foot centers A3) Two pipeline bridges, one 330 feet across Bat Cave Wash, one 280 feet east of Bat Cave Wash A4) One grade separation structure west of Bat Cave Wash		
Range of estimated soil removed for Bat Cave Wash bridge: The western bridge landing based on conversations on 12/27/13 in the field would require removal of part of a slope on the southern side of the Southern California Gas Company pipeline easement to provide separation from the pipeline. Soil removal amounts would be in the hundreds of cubic yards but detailed engineering would be necessary to evaluate.		

Removal/Demo issues: Above grade structures such as bridges, pipe supports and piping could be removed. Deep concrete footings for bridge structures may be left in place or removed by breaking and removing concrete and digging out footings. Grade would be restored by installation of backfill in the footings.		

SUMMARY EVALUATION for SEGMENT 4, PIPELINE A: While this is listed as single-option segment, there is another option that could be followed, with above-ground infrastructure, the proposed 60% BOD Report pipeline section A alignment from the western end of Segment 1, discussed above, to the eastern end of Segment 2, also discussed above. We provide this option, because it will likely be less-intrusive, visually. If City of Needles' power is used for IRL-1 thru IRL-4 and FW-1, there would be no power poles along this segment. If PG&E provides its own power, power poles would be required. One pipeline bridge would be eliminated, and the Bat Cave Wash pipeline bridge would be moved to a lower elevation and farther to the north. We anticipate that considerably less excavation and ground disturbance would be required. PG&E would likely need to close the road or convert it to one-way traffic in order to fit the above-ground infrastructure onto the edge of the existing roadway.

Options for connection of groundwater pipelines from IRL-3 to IRL-4. The 60 % BOD Report alignment is along a narrow access road that has culturally sensitive land on each side, so it is imperative to prevent additional disturbance which would be caused by widening the access road. A buried pipeline and conduits through this section would minimize the footprint in this area.

Options for Pipeline H		
A) Install Pipeline and electrical based on 60-% BOD Report design but aligned in the center of the existing access road and the newly extended road to IRL-4 Structural components include: A1) Buried electrical and control conduits and water pipelines from IRL-3 to IRL-4 A2) Pipeline and electrical trenches approximately 7 feet wide depth 3 to 4 feet A3) Electrical trench will include red concrete encasement around the high voltage line (approximately 1/2-foot by 1-foot). A4) Grading of access road from mesa to IRL-4 location, using existing cut slope. This alternative would be attractive if the retaining wall going to IRL-4 could be eliminated and the trench could be installed in the new access road that would be constructed down to IRL-4.	**B) Install Pipeline and electrical based on 60-percent BOD design but aligned in the existing access road and transition to above-grade along the newly extended road to IRL-4. Install retaining wall along access road.** Structural components include: B1) Buried electrical and control conduits and groundwater pipelines from IRL-3 to new access road to IRL-4 B2) Above ground-electrical and control conduits and groundwater pipelines along new access road to IRL-4. B3) structural pipe supports (concrete footings ~2' diameter 6' deep into based by CH2M conceptualizations) spaced 20 feet on center B4) Above-ground electrical lines and control on poles ~40-foot power poles on average of 100 feet centers B5) Installation of W style guard rail; assumes post imbedded 4 feet every 6 feet. Road widening would probably result from detailed engineering of guard rail system and additional area of disturbance. B6) Install approximately 90 feet of retaining wall, cut back undisturbed slope approximately 6-8 feet.	

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Range of estimated soil removed for trenching: Given the assumption of 100 lineal feet and 7 feet wide and an average excavation depth of 3.5 feet assumption, potential disturbed earth would be 90 cubic yards per 100 feet of pipeline and electrical.	Range of estimated soil removed for trenching: For the below grade section given the assumption of 100 lineal feet and 7 feet wide and an average excavation depth of 3.5 feet assumption, potential disturbed earth would be 90 cubic yards per 100 feet of pipeline and electrical. The retaining wall would take a minimum 200 cubic yards of disturbance, approximately double the volume of disturbance resulting from the buried pipeline.	
Removal/Demo issues: Trench could be dug out to remove piping and dyed concrete.	Removal/Demo issues: <u>Above grade structures</u> panels, pipe, pipe supports, power poles, and guard rails could be removed. Retaining wall would not likely be removed since it would protect the access road to IRL-4. If road removed then the wall could be re-contoured and re-vegetated. <u>Pipe support and pole footings</u> could be excavated and removed. Area would need to be backfilled with appropriate material	

SUMMARY EVALUATION for SEGMENT H: The narrow width of the existing one-lane access road, and existing embankment where road would be built to provide access down to IRL-4 does not appear to allow for both vehicle access and above grade piping and supports. The additional width would also require a retaining wall on the existing cut slope, and more slope cutback to provide safe wide enough access for field vehicles. It appears clear that the Tribes may wish the foot print of activity in this area to remain strictly constrained to the existing dirt road, therefore, in this instance placing the water pipes in the center of the access road for segment H may be preferable in order to prevent additional encroachment in this area.

Notes: 1.Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. See Figure 5 for Overhead Electical.

LEGEND

EIR Project Area

Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.

Freshwater Injection Well

Injection Well (Inner Recirculation Loop)

Proposed Electrical Transformer Location

FIGURE 4
PIPELINES A/H ALTERNATIVE ROUTE 2 (ALTERNATIVE 2)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

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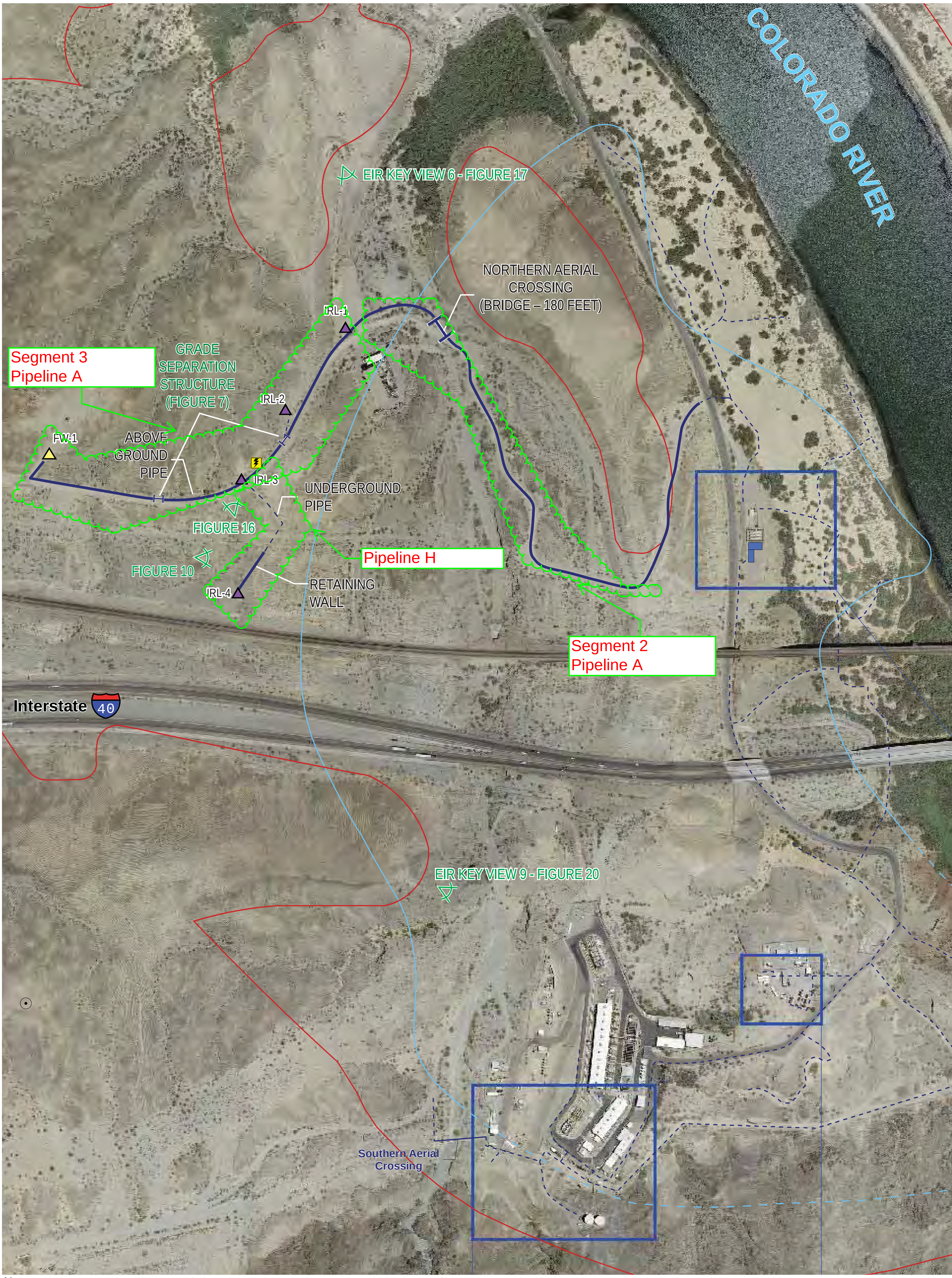

Notes: 1.Conceptual Visualization - This is for illustration purposes only and is not intended as an engineering design.
2. See Figure 5 for Overhead Electical.

LEGEND

EIR Project Area

Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.

Freshwater Injection Well

Injection Well (Inner Recirculation Loop)

Proposed Electrical Transformer Location

FIGURE 2
PIPELINES A/H CURRENT ROUTE ABOVE GROUND (ALTERNATIVE 0a)
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

ES110813183449BAO_Topock_AboveGroundPipeline_Design_Alt.ai_111113_lho/it

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VIA ELECTRONIC MAIL

March 6, 2014

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Topock Project Manager
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5796 Corporate Avenue
Cypress, California 90630

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: Fort Mojave Indian Tribe Comments on Alternative Pipeline Routings and Proposed Soil Storage/Staging Areas for the Topock Compressor Station 60% Groundwater Remedy Design

Dear Mr. Yue and Ms. Innis:

Hargis + Associates, Inc. ("H+A"), on behalf of and at the request of its client, the Fort Mojave Indian Tribe ("the Tribe" or "FMIT"), is hereby providing this letter regarding the Tribe's review of alternative pipeline routings for the Topock Compressor Station 60% groundwater remedy design (Enclosure A).

As you are aware, these alternative routings have been the subject of discussion at recent meetings of the Technical Working Group ("TWG") and, most recently, the FMIT along with representatives of the Hualapai, Colorado River Indian Tribes, and Cocopah, performed a site walk on February 21, 2014, during which tribal representatives and their technical consultants conferred on the acceptability of these various alternatives. The FMIT was represented by nine Tribal members including a member of Tribal Council. Afterwards, the FMIT members conferred and completed the enclosed matrix providing the Tribe's position on each of the various segments along the pipeline route (Enclosure A). This information is being provided as the Tribe's final comments on the 60% design, with the understanding that you will be directing the Pacific Gas & Electric Company ("PG&E") to take this information into consideration during the preparation of the 90% Basis of Design. The matrix also assumes that any construction or deconstruction would be done in the least impactful manner and in consultation with the Tribe.

Additionally, the Tribe is also presenting herein its position on the various staging and soils storage areas proposed by PG&E (Enclosures B & C). Please find an attached matrix addressing those preferences. Please note that on the matrix, there are several sites for which the Tribe has outstanding questions. Therefore, before the Tribe can determine the final acceptability of these sites, answers to these questions need to be provided to the Tribes.

Finally, the Tribe wishes to add that the comments and preferences as expressed herein do not in any way constitute an endorsement or acceptance of the design as originally presented or as potentially modified by these alternatives. For as you have repeatedly been made aware, many of the adverse impacts associated with this project are permanent and irreversible.

Thank you in advance for consideration of these comments. Please contact me if you have further questions.

Sincerely,

HARGIS + ASSOCIATES, INC.

Leo S. Leonhart

Leo S. Leonhart, PhD, PG, CHG
Principal Hydrogeologist

LSL/keh

Enclosures: A -FMIT Pipeline Segment Analysis
B - Soils Staging / Construction Areas FMIT Comment Table
C – Staging Areas Map

cc w/encl: C. Coyle
C. Garcia, FMIT
K. Liebhauser, BLM
N. McDowell, FMIT
L. Otero, FMIT
T. Williams, FMIT
Tribal Representatives for Hualapai, CRIT, Chemehuevi, Cocopah

ENCLOSURE A

FMIT PIPELINE SEGMENT ANALYSIS

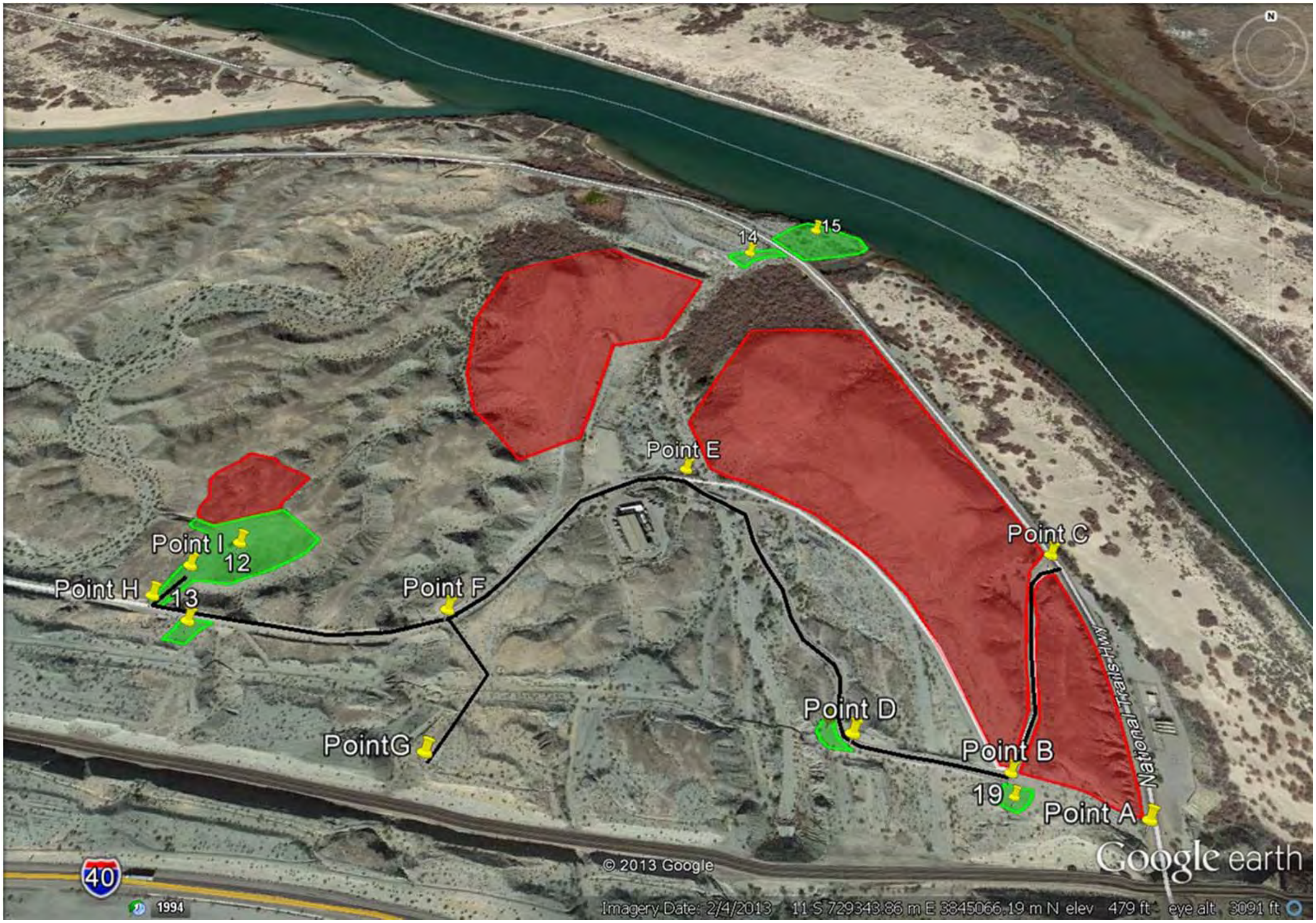
PIPELINE SEGMENT ANALYSIS

PIPELINE POINTS (Segment Description)	**ABOVE/BELOW GROUND**	**CONDITIONS OF USE COMMENTS**
A TO B (NTH near MW20 Bench, access upslope to top of slope, adjacent to the SoCal pipeline easement)	NEITHER	After much review and consideration, there does not seem to be either an above- or below-ground alternative for this segment that appears acceptable. Assuming it will not be possible to intrude into the easement, instead, use the "C to B" segment for piping alignment
C TO B (Entrance along NTH, along road south of Locus B; to top of slope, across from MW20 bench)	Below	Although above-ground is generally preferred, the narrowness of the roadway along this segment makes it unlikely the piping could be placed above ground with sufficient road access without making significant cuts and disturbance into the in-place geologic materials alongside this road segment. Note this segment of road runs through a large cultural area on either side, therefore no additional disturbance, outside of the present-day existing roadway, should be made. 1) No additional cuts would be made into the banks on either side of the roadway. 2) Existing slopes would not be disturbed. 3) No activity, storage or personnel activity should extend beyond the current roadway. This includes the slopes adjacent to the existing road. All below ground piping will be removed after remedy completion.
B TO D (Section of dirt access road from top of slope west to Bat Cave Wash)	Above	Given the wide road access along this segment, above-ground piping could be installed. 1) Construction activity, storage and personnel activity should be limited to the roadway to the extent possible to minimize encroachment into the areas adjacent to the existing road.
D TO E (Continuing along access road, along the east side of Bat Cave Wash to where road crosses wash near IM-3)	Above	1) Construction activity, storage and personnel activity should be limited to the roadway to the extent possible to minimize encroachment into the areas adjacent to the existing road.
E TO F (From Bat Cave Wash crossing, along Route 66 westward past IM-3 to IRL-3)	Above	Above-ground installation is preferred. 1) No additional cuts would be made into the banks on either side of the roadway. 2) Existing slopes would not be disturbed.

PIPELINE SEGMENT ANALYSIS

PIPELINE POINTS (Segment Description)	**ABOVE/BELOW GROUND**	**CONDITIONS OF USE COMMENTS**
F TO G (From IRL-3 along single land dirt access road, down into wash and location of IRL-4.)	Below	This short section from IRL-3 to IRL-4 in the wash is along a narrow, one-lane access road. The narrow width of the existing one-lane access road, and existing embankment where road would be built to provide access down to IRL-4 does not appear to allow for both vehicle access and above-ground piping and supports. While above-ground installation is preferred where possible, placing the injection well piping below-ground along this segment should constrain disturbance to the foot print of the existing roadway 1) Activity and construction in this area to remain strictly constrained to the existing dirt road. 2) Construction of the roadway down into the wash for IRL-4 should consist of fill placement, rather than any additional cut, to the extent possible. 3) All below ground piping will be removed after remedy completion.
F TO H TO I (From IRL-3, west along Route 66 to FW-1)	Above	Above ground installation is preferred. 1) No additional cuts would be made into the banks on either side of the roadway. 2) Existing slopes would not be disturbed.

PIPELINE SEGMENT ANALYSIS



HARGIS + ASSOCIATES, INC.

ENCLOSURE B

SOILS STAGING / CONSTRUCTION AREAS
FMIT COMMENT TABLE

Soils Staging / Construction Areas FMIT Comment Table

STORAGE/STAGING AREA		ACERAGE	LOCATIONS / NOTES	COMMENTS
1-5	**Soils storage**	11.1	All in Park Moabi Area	*Tribes said yes (CHPMP 1/14)*
6	**Soils storage**	0.67	Across from IM-3	*Tribes said no (CHPMP 1/14)*
7	**Soils storage**	0.28	East of #6	*Tribes said no* (CHPMP 1/14)
8	**Soils storage**	0.17	Southeast of #7	*Tribes said no* (CHPMP 1/14)
9	**Construction Staging**			*Tribes said yes (CHPMP 1/14)*
10	**Construction Staging**	0.51		*Tribes said yes (CHPMP 1/14)*
11	**Construction Staging**	5.69		*Tribes said no (CHPMP 1/14)*
12	**Construction Staging**	1.53		*Tribes said no (CHPMP 1/14)*
13	**Soils storage**	0.15		*Tribes said no (CHPMP 1/14)*
14	**This site is proposed for construction materials**	0.28	This is CA-SBR-11862H. BLM is the agency to make determinations of eligibility, not PGE as in PGE's report [1](pp22-25). On the map in the report, (see footnote 1) page 25, maze remnants are visible slightly southwest of the boundary of CA-SBR-11862H.	Tribes have questions: 1. Is it temporary? 2. Fencing? With what? 3. SHPO Clearance? 4. What activities? 5. Lighting? 6. Extent of the staging area? From where to where? 7. What has BLM determined regarding eligibility and potential impacts to this area?
15	**This site is proposed for construction materials**	1.11	*On the map, this site is across Old National Trails Highway along the river. There is creosote here. Animals go down into the outlet area for water. Has a rock-lined walkway down. There is a small beach area (when low water). This is the end of Bat Cave Wash.*	Tribes have questions: 1. Vegetation removal? Tribes do not want vegetation removed. 2. Wider access = modifications? Tribes do not want that. 3. Watchmen, guards, restrooms? 4. What activities? 5. Lighting? Generators? 6. When was this area last surveyed for cultural materials? 7. Extent of the staging area? From where to where?
16		0.06		*Tribes said no*

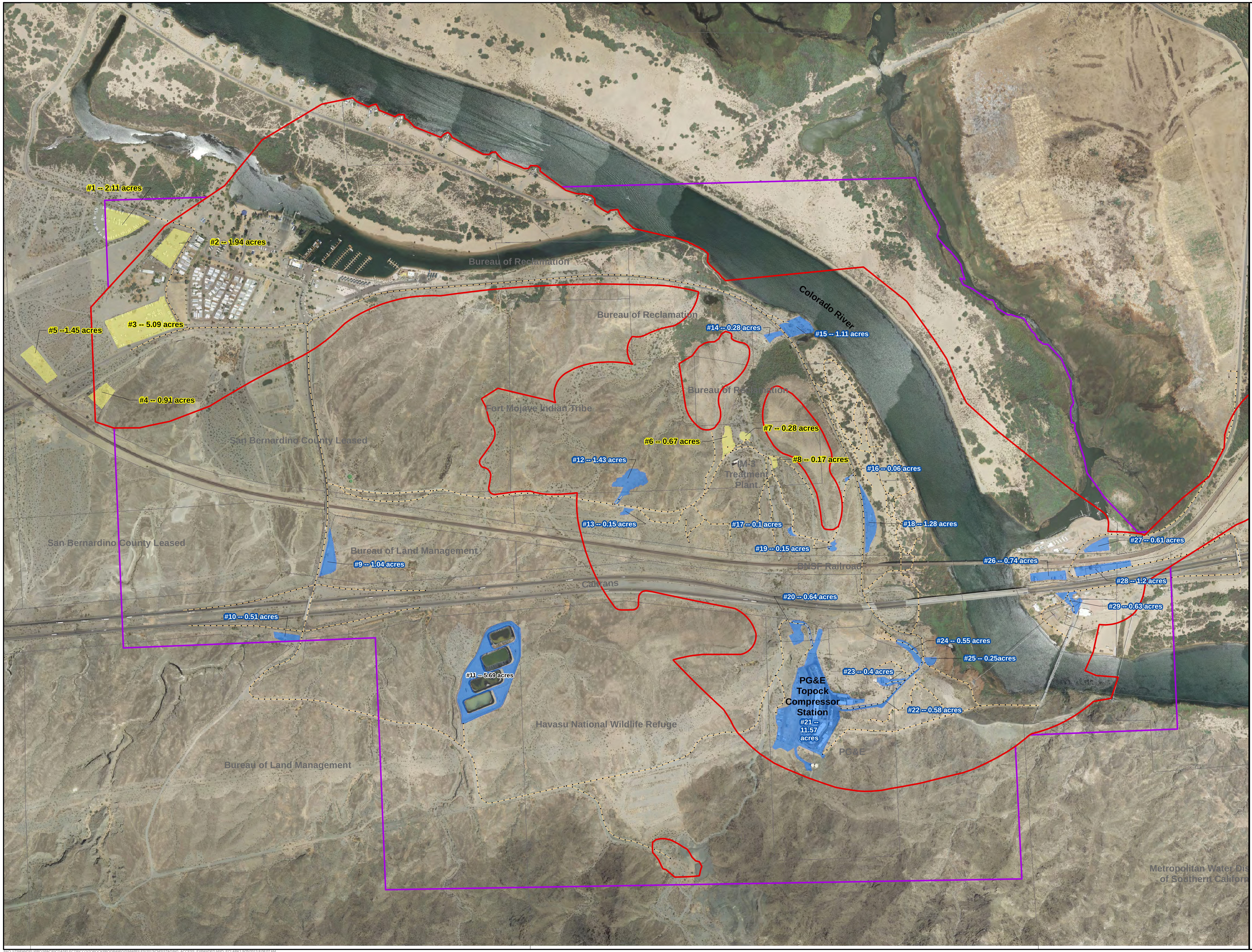
[1] National Register of Historic Places Eligibility Evaluation of CA-SBR-11862H, San Bernardino California, David D. Earle and Barry A. Price. Prepared by Applied Earthworks and Earle and Associates, submitted to Pacific Gas and Electric Co. September 2013.

Soils Staging / Construction Areas FMIT Comment Table

17	<u>This site is proposed for construction materials</u>	0.1		*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?
18		1.28		*Tribes said yes (CHPMP 1/14)*
19	<u>This site is proposed for construction materials</u>	0.15	Located across from the southern tip of CA-SBR-219 Locus B (Maze). There is a better place to the west (down the slope) where there already exists a large level place with a well (MW25) Why not go there instead? Proposed IRL7 near- by. Also N (?).	*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?
20	<u>This site is proposed for construction materials</u>	0.1		*Tribes still need to visit this site*
21	**Construction Staging**	11.57	Compressor Station	*Tribes said yes (CHPMP 1/14)*
22	**Construction Staging**	0.58		*Tribes said yes (CHPMP 1/14)*
23	**Construction Staging**	0.4		*Tribes said yes (CHPMP 1/14)*
24	**Construction Staging**	0.55		*Tribes said yes (CHPMP 1/14)*
25	**Construction Staging**	0.25		*Tribes said no (CHPMP 1/14)*
26	**Construction Staging**	0.74		*Tribes said yes (CHPMP 1/14)*
27	**Construction Staging**	0.61		*Tribes said yes (CHPMP 1/14)*
28	**Construction Staging**	1.2		*Tribes said yes (CHPMP 1/14)*
29	**Construction Staging**	0.63		*Tribes said yes (CHPMP 1/14)*

ENCLOSURE C

STAGING AREA MAP



LEGEND

- EIR Project Area
- Area of Potential Effects (APE)
- Proposed Access Routes
- Potential Soil Storage Area/ Proposed Staging Area
- Proposed Staging Areas

Notes:

1. PG&E may use all or a subset of these potential temporary staging areas during remedy construction.
2. Note that in compliance with EIR mitigation measure CUL-1a-9 as well as PA and CHPMP mitigation measures, the proposed access route west of National Trails Highway is located in an existing, previously disturbed, access road. The location of the access road was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10 and PA and CHPMP mitigation measures

N

0 300 600 1,200 Feet

Updated per September 17-18 TWG Discussion

FIGURE 7.6-1
PROPOSED STAGING AREAS, CONSTRUCTION YARD, AND ACCESS ROUTES

GROUNDWATER REMEDY BASIS OF DESIGN REPORT
INTERMEDIATE (60%) DESIGN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Hualapai Department of Cultural Resources
P.O. Box 310
Peach Springs, Arizona 86434
Office: 928.769.2223 FAX: 928.769.2235

March 10, 2014 **HDCR File: 2014-663**

VIA ELECTRONIC MAIL
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Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: 60% Pipeline Alternatives and Soils / Staging Matrices

Dear Mr. Yue:
On behalf of the Hualapai Tribe, we appreciate being able to discuss pipeline alternatives as presented in various meetings and consultative group walks regarding the 60% Basis of Design for the Topock Remediation Project. As you are aware, the Hualapai along with other Tribal representatives met at Topock on February 21st, 2014 to visit and discuss alternative pipeline routings for the 60% groundwater remedy. Hualapai tribal representatives and two Hualapai Tribal Council members were present during this meeting. After the meeting it was agreed that a pipeline matrix and soils staging area table would be sent to interested tribes that included tribal comments wile in the field.

In this letter we formally present Hualapai's comments regarding pipeline alternatives and soils / staging areas considered by Pacific Gas & Electric for the 90% Basis of Design. Even though we are aware that the groundwater remedy infrastructure is creating permanent and irreversible cumulative negative impacts, both spiritually and to the cultural landscape at Topock, we are confident that PG&E will do everything in their power to remove all infrastructure components (whether or not pipelines are placed above or below ground) five years after all remediation activity ceases.

Figure 1 below, shows pipeline alternatives with Table 1 documenting comments from Hualapai. Regarding Table 2, below, this table has tribal responses that were solicited on January 14, 2014. It also has comments and questions regarding several areas visited on February 21st. Perhaps we can discuss these at the March 14th CHPMP meeting with BLM. There is one outstanding soils location (#20) that still requires visitation. Perhaps we can do this on March 14th, 2014 (CHPMP meeting with BLM, in the morning followed by visit to Topock), when we will be out at Topock.

We appreciate our on-going consultations and collaborations with the Topock Remediation Project and look forward to meaningful dialogue through-out the up-coming years. If you have any concerns please feel free to contact myself, or Dawn Hubbs, Program Manager and we will be happy to assist you.

Sincerely,

Loretta Jackson-Kelly

Loretta Jackson-Kelly, Director and Tribal Historic Preservation Officer
Hualapai Department of Cultural Resources

Cc:
Mr. Rudy Clark, Sr., Councilman, Hualapai Tribal Council
Mr. Robert Bravo, Councilman, Hualapai Tribal Council
Karen Baker, CHG, CEG, Chief, Geological Services Branch
Tribal Reps

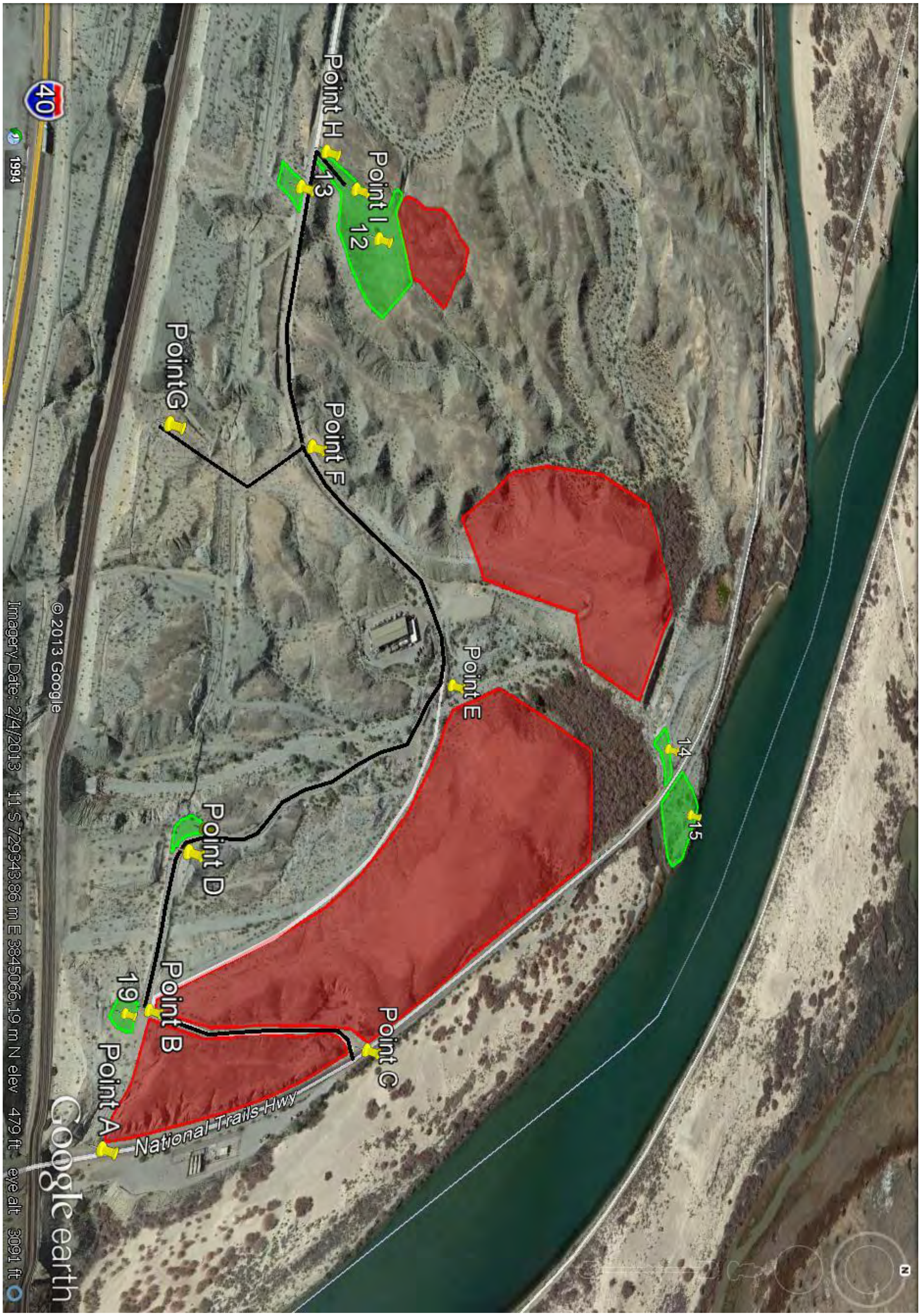

Figure 1: Red Areas = Cultural Sites - Green Areas = Soils Staging Areas - Black Line = Pipeline

Table 1: Hualapai Department of Cultural Resources Pipeline Points and Comments

PIPELINE POINTS	ABOVE/BELOW GROUND	CONDITIONS OF USE COMMENTS
A TO B	**Neither.** Hualapai do not want to see this alternative used at all.	Hualapai do not want this segment of the pipeline to be used. There is significant damage to this area (which is not being refurbished or maintained for erosion and run-off) and this segment would cause more damage. It would also impact a multi-component archaeological site. Avoidance is recommended.
B TO C	**Below Ground**	The segment is in an existing road. Please go in the center of the road, no additional widening or slope cutting due to cultural materials on the upper slopes. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.
B TO D	**Above Ground or Below Ground**	The segment is in an existing road. Please go in the center of the road, no additional widening or slope cutting. Soils location 19 is near this segment. We would prefer that this segment not utilize location 19 as there is a point west and down the road that would be preferable for staging. See Table 2. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.
D TO E	**Above Ground or Below Ground**	The segment is in an existing road. Please go in the center of the road, no additional widening or slope cutting. Cultural materials are in this vicinity. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance

		levels of Chrome VI.
E TO F	**Above Ground or Below Ground**	The segment is in an existing road. Please go in the center of the road, no additional widening or slope cutting. Prefer minimal bridge construction considerations. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.
F TO G	**Below Ground**	This is a very small area without a lot of room. There is an archaeological site (CA-SBR-11939) in this area and there is a plan to put IRL3 in this vicinity also. There is going to be a great deal of activity in this small area, so we request cultural clearances with tribal monitors in attendance, prior and during this segment's construction phase. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.
F TO H TO I	**Above Ground**	This area is very close to cultural materials. Prefer that there be no additional widening of the existing road. We request cultural clearances with tribal monitors in attendance, prior and during this segment's construction phase. There is a plan to put FW1 near this location also. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.

Table 2: Soils Staging / Construction Areas Hualapai Comment Table

STORAGE/STAGING AREA	ACERAGE	LOCATIONS / NOTES	COMMENTS
1-5 Soils storage	11.1	All in Park Moabi Area	*Tribes said yes (CHPMP 1/14)*
6 Soils storage	0.67	Across from IM-3	*Tribes said no (CHPMP 1/14)*
7 Soils storage	0.28	East of #6	*Tribes said no* (CHPMP 1/14)
8 Soils storage	0.17	Southeast of #7	*Tribes said no* (CHPMP 1/14)
9 Construction Staging			*Tribes said yes (CHPMP 1/14)*
10 Construction Staging	0.51		*Tribes said yes (CHPMP 1/14)*
11 Construction Staging	5.69		*Tribes said no (CHPMP 1/14)*
12 Construction Staging	1.53		*Tribes said no (CHPMP 1/14)*
13 Soils storage	0.15		*Tribes said no (CHPMP 1/14)*
14 ***<u>This site is proposed for construction materials</u>***	0.28	This is CA-SBR-11862H. BLM is the agency to make determinations of eligibility, not PGE as in PGE's report [1](pp22-25). On the map in the report, (see footnote 1) page 25, maze remnants are visible slightly southwest of the boundary of CA-SBR-11862H.[2]	Tribes have questions: 1. Is it temporary? 2. Fencing? With what? 3. SHPO Clearance? 4. What activities? 5. Lighting? 6. Extent of the staging area? From where to where? 7. What has BLM determined regarding eligibility and potential impacts to this area?
15 ***<u>This site is proposed for construction materials</u>***	1.11	*On the map, this site is across Old National Trails Highway along the river. There is creosote here. Animals go down into the outlet area for water. Has a rock-lined walkway down. There is a small beach area (when low water). This is the end of Bat Cave Wash.*	Tribes have questions: 1. Vegetation removal? Tribes do not want vegetation removed. 2. Wider access = modifications? Tribes do not want that. 3. Watchmen, guards, restrooms? 4. What activities? 5. Lighting? Generators? 6. When was this area last surveyed for cultural materials? 7. Extent of the staging area? From where to where?
16	0.06		*Tribes said no*
17 ***<u>This site is proposed for construction materials</u>***	0.1		*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?
18	1.28		*Tribes said yes (CHPMP 1/14)*
19 ***<u>This site is proposed for construction materials</u>***	0.15	Located across from the southern tip of CA-SBR-219 Locus B (Maze). There is a better place to the west (down the slope) where there already exists a large level place with a well	*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?

[1] National Register of Historic Places Eligibility Evaluation of CA-SBR-11862H, San Bernardino California, David D. Earle and Barry A. Price. Prepared by Applied Earthworks and Earle and Associates, submitted to Pacific Gas and Electric Co. September 2013.
[2] Please note that management recommended that this site be avoided. Therefore this location is not suitable for staging. Please refer to *Topock Remediation Project Additional Soils Investigation, Condition Assessments at Fourteen Archaeological and Historical Sites,* Hearth, et. Al. Prepared by Applied Earthworks Inc., submitted to PG&E November 2013, reference site recordCA-SBR-11862H #8, page 1 of 5.

		(MW25) Why not go there instead? Proposed IRL7 near- by. Also N (?).	

STORAGE/STAGING AREA	ACERAGE	LOCATIONS / NOTES	CONDITIONS OF USE COMMENTS
20 ***<u>This site is proposed for construction materials</u>***	0.1		*Tribes still need to visit this site*
21 Construction Staging	11.57	Compressor Station	*Tribes said yes (CHPMP 1/14)*
22 Construction Staging	0.58		*Tribes said yes (CHPMP 1/14)*
23 Construction Staging	0.4		*Tribes said yes (CHPMP 1/14)*
24 Construction Staging	0.55		*Tribes said yes (CHPMP 1/14)*
25 Construction Staging	0.25		*Tribes said no (CHPMP 1/14)*
26 Construction Staging	0.74		*Tribes said yes (CHPMP 1/14)*
27 Construction Staging	0.61		*Tribes said yes (CHPMP 1/14)*
28 Construction Staging	1.2		*Tribes said yes (CHPMP 1/14)*
29 Construction Staging	0.63		*Tribes said yes (CHPMP 1/14)*

Table 2: Soils Staging / Construction Areas Hualapai Comment Table (Continued from page 3)

THE COCOPAH INDIAN TRIBE
Cultural Resource Department
14515 S. Veterans Drive
Somerton, Arizona 85350
Telephone (928) 627-4849
Fax (928) 627-3173

Project Number: CCR-032-06-001

VIA ELECTRONIC MAIL March 13, 2014

Mr. Aaron Yue
Topock Project Manager
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, California 90630

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: 60% Pipeline Alternatives and Soils / Staging Areas

Dear Mr. Yue/Ms. Innis:

The Cocopah Indian Tribe appreciates the opportunity to provide comments and discuss the 60% Pipeline Alternatives and Soils / Staging Areas.

The Cocopah Indian Tribe along with council members and representatives from other interested tribes, visited the Topock area on February 21, to view and walk the Soil Staging areas proposed by PG&E and the alternative pipeline route for the Topock Compressor Station 60% groundwater remedy design. During this meeting and site walk, it was agreed that a table and map illustrating the staging and pipeline route would be produced and used to provide comments regarding the staging areas and pipeline route.

Attached you will find Cocopah's comments regarding the Pipeline route and Staging areas. The attachments are as follows:

- Figure 1 is a map illustrating the Staging areas and Pipeline
- Table 1: Cocopah Comments regarding Pipeline Points
- Table 2: Cocopah Comments regarding Soils Staging / Construction Areas

If you have any questions feel free to contact me at: Cell: 928-287-5042 or Office: 928-627-4849, or by email at CocopahTPM@Gmail.com

Thank you

Edgar Castillo
Cocopah Indian Tribe
Topock Project Manager

Cc:
Aaron Yue, DTSC
Pam Innis, DOI
Jill McCormick, Cocopah Indian Tribe
Nora McDowell, Fort Mojave Indian Tribe
Dawn Hubbs, Hualapai Indian Tribe
Doug Bonamici, Colorado River Indian Tribes
Karen Baker, CHG, CEG, Chief, Geological Services Branch

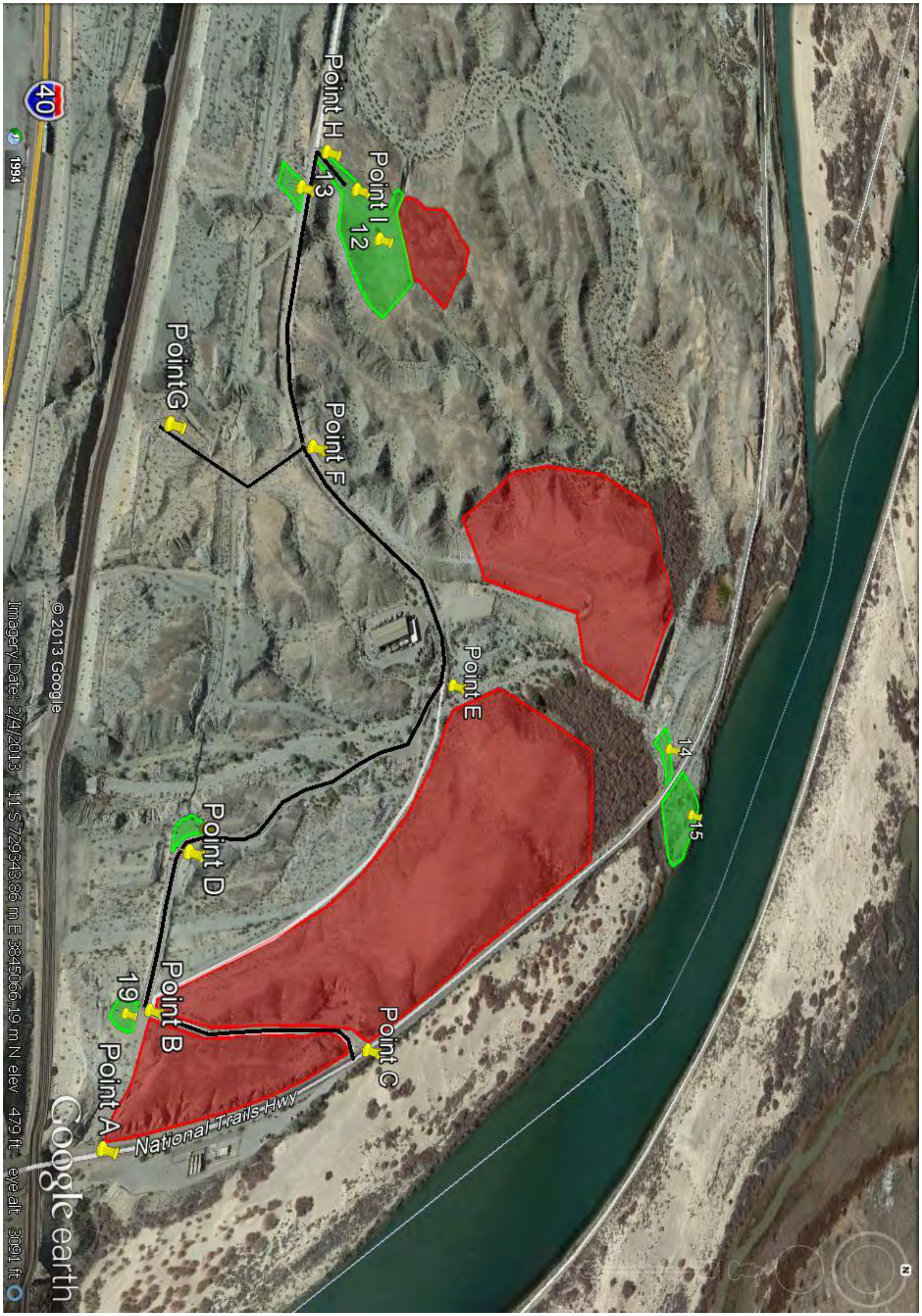

Figure 1: Red Areas = Cultural Sites
Green Areas = Soils Staging Areas
Black Line = Pipeline

Table 1: Cocopah Comments on the Pipeline Points

PIPELINE POINTS	ABOVE/BELOW GROUND	CONDITIONS OF USE COMMENTS
A TO B	Neither	Tribe's conclusion is that this is not an acceptable route for the pipeline. It is noted that there is significant damage to this area and this pipeline segment would cause more damage. The tribe recommends that this area be avoided.
C TO B	Above/Below	This segment intersects a large Cultural Resources Area. Any additional widening or cutting into the sides of the road is to be avoided as to not cause any damage to the cultural materials present on the slopes. All activity including staging, storage or personnel would be strictly limited to the roadway. Piping should go in the center of the existing roadway. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
B TO D	Above/Below	This segment is in an existing roadway. All activity including staging, storage or personnel would be strictly limited to the roadway. Piping should go in the center of the existing roadway. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
D TO E	Above/Below	This segment is in an existing roadway. All activity including staging, storage or personnel would be strictly limited to the roadway. Piping should go in the center of the existing roadway. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
E TO F	Above/Below	This segment is in an existing roadway. All activity including staging, storage or personnel would be strictly limited to the roadway. Piping should go in the center of the existing roadway. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
F TO G	Above/Below	This is a small area that contains archaeological site CA-SBR-11939. Cultural clearances with tribal monitors are requested, prior to and during construction. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
F TO H TO I	Above/Below	This area is very close to cultural materials. Cultural clearances with tribal monitors are requested, prior to and during construction as with the previous point. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.

Table 2: Cocopah Comments on the Soils Staging / Construction Areas

STORAGE/STAGING AREA	ACERAGE	LOCATIONS / NOTES	COMMENTS
1-5 Soils storage	11.1	All in Park Moabi Area	*Tribes said yes (CHPMP 1/14)*
6 Soils storage	0.67	Across from IM-3	*Tribes said no (CHPMP 1/14)*
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13 Soils storage	0.15		*Tribes said no (CHPMP 1/14)*
14 ***<u>This site is proposed for construction materials</u>***	0.28	This is CA-SBR-11862H. BLM is the agency to make determinations of eligibility, not PGE as in PGE's report [1](pp22-25). On the map in the report, (see footnote 1) page 25, maze remnants are visible slightly southwest of the boundary of CA-SBR-11862H.	Tribes have questions: 1. Is it temporary? 2. Fencing? With what? 3. SHPO Clearance? 4. What activities? 5. Lighting? 6. Extent of the staging area? From where to where? 7. What has BLM determined regarding eligibility and potential impacts to this area?
15 ***<u>This site is proposed for construction materials</u>***	1.11	*On the map, this site is across Old National Trails Highway along the river. There is creosote here. Animals go down into the outlet area for water. Has a rock-lined walkway down. There is a small beach area (when low water). This is the end of Bat Cave Wash.*	Tribes have questions: 1. Vegetation removal? Tribes do not want vegetation removed. 2. Wider access = modifications? Tribes do not want that. 3. Watchmen, guards, restrooms? 4. What activities? 5. Lighting? Generators? 6. When was this area last surveyed for cultural materials? 7. Extent of the staging area? From where to where?
16	0.06		*Tribes said no*
17 ***<u>This site is proposed for construction materials</u>***	0.1		*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?
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19 ***<u>This site is proposed for construction materials</u>***	0.15	Located across from the southern tip of CA-SBR-219 Locus B (Maze). There is a better place to the west (down the slope) where there already exists a large level place with a well (MW25) Why not go there instead? Proposed IRL7 near- by. Also N (?).	*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?

[1] National Register of Historic Places Eligibility Evaluation of CA-SBR-11862H, San Bernardino California, David D. Earle and Barry A. Price. Prepared by Applied Earthworks and Earle and Associates, submitted to Pacific Gas and Electric Co. September 2013.

Table 2: Cocopah Comments on the Soils Staging / Construction Areas (Cont. from page 5)

STORAGE/STAGING AREA	ACERAGE	LOCATIONS / NOTES	CONDITIONS OF USE COMMENTS
20 ***This site is proposed for construction materials***	0.1		*Tribes still need to visit this site*
21 Construction Staging	11.57	Compressor Station	*Tribes said yes (CHPMP 1/14)*
22 Construction Staging	0.58		*Tribes said yes (CHPMP 1/14)*
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28 Construction Staging	1.2		*Tribes said yes (CHPMP 1/14)*
29 Construction Staging	0.63		*Tribes said yes (CHPMP 1/14)*

From: Doug Bonamici [mailto:dbonamici@critdoj.com]
Sent: Monday, March 10, 2014 2:36 PM
To: Yue, Aaron@DTSC
Cc: howard.magill@crit-nsn.gov; Wilene Fisher-Holt; Margaret R. Eggers; Nora McDowell; Dawn Hubbs; Edgar Castillo; Charlie Schlinger; Baker, Karen@DTSC
Subject: Comments on Noise/ Vibration and Pipeline Routing

Mr. Yue, the Colorado River Indian Tribes will not be submitting further comment for the 60% Design phase on the Noise and Vibration issues nor on the Pipeline Routing issues at this time. We have participated in the discussions of those issues, and are satisfied the DTSC, DOI and PG&E have heard our concerns directly, and through the other Tribal comments. We will consider adding further input as the design process moves forward.
Thank you for your efforts in this regard. db

Douglas F. Bonamici
Law Clerk, Office of the Attorney General
Colorado River Indian Tribes
26600 Mohave Rd.,
Parker, Arizona 85344
Phone: 928-669-1271
Email: doug.bonamici@crit-nsn.gov

Attachment B: RTC# 2

Info for the Refuge's Appropriate Use Analysis/Compatibility Determination

Information for the Refuge's Appropriate Use Analysis and Compatibility Determination (AUA/CD)	
Items listed in DOI's October 23, 2008 letter *"PG&E Topock Compressor Station Remediation Site – Evaluation of Attainment of Fish and Wildlife Service Location-Specific ARARs for the Proposed Remedial Alternatives"*	**Action (60% Design Report Compliance Status)**
What the proposed actions/ facilities are – including specifics (such as how many wells, the spacing of wells, detailed sizes/lengths of facilities, etc.)	The 60% design was submitted to DOI on April 5, 2013. Section ES. 3 and Table ES-1 (Summary of Engineering Design Parameters and Key features) of the 60% BOD report provide an executive summary and high level description of the remedy features (wells, pipelines, supporting systems and utilities, structures/buildings, access roads, etc.) including references to specific report figures that show the locations of these features. Detailed descriptions of the remedy features are provided throughout the BOD report, specifically: • Section 3.2 describes the in-situ remediation system and its configuration including the IRZ wells, the Riverbank extraction wells, the Inner Recirculation Loop wells, the TCS Recirculation Loop wells, the Freshwater injection wells, and the associated pipeline alignment. • Section 3.3 describes the source of freshwater, the pre-injection treatment system, and freshwater piping conveyance including storage. • Section 3.4 describes the remedy-produced water management system. • Section 3.5 describes the utilities and other supporting facilities including power supply, SCADA, and structures/ buildings to support the remedy. • Section 3.6 describes the monitoring network/wells. • Section 5 describes the ICs which are also required components of the remedy.
Where the use would be conducted – including specific areas of use, habitat types and acres, key wildlife species that occur there, proportion of refuge or habitat type involved, and other areas affected incidental to use – provide in site maps	Section 2.4 (Other Site Conditions Affecting Design) of the 60% BOD report describes the baseline site conditions that affect remedy design. Among the documented conditions related to ecological resources at the site are surface water and wetlands, vegetation communities, special status plants, and special status wildlife, avian, and aquatic species. A series of maps were provided in Section 2.4 that overlays the remedy features on surveyed ecological resources – notably Figure 2.4-5 (Jurisdictional Waters and Wetlands), Figure 2.4-9 (Vegetation Communities), Figure 2.4-10 (Habitat of Desert Tortoise Species), and Figure 2.4-11 (Indigenous Plants of Traditional Cultural Significance). Updates to these site maps will be included in the 90% design. In addition, an additional map will be prepared to reflect the survey results for arrowweed and lycium conducted in response to 60% design comment #311 DOI-140.

When the use would be conducted—including time of day and year; duration of use; and a timeline of implementing, performing/ maintaining, and closing out the actions/facilities	An estimated project schedule is included in Exhibit 7.5-1 of the 60% BOD report. Exhibit 7.5-1 provides an estimated timeline for implementing the remedial action through remedy start-up and start of full remedy operations (anticipate end of 2017). Consistent with the CMS/FS and Agencies Decision Documents (ROD, Statement of Basis), it is anticipated that this remedy could require 30 years of operations on refuge lands. Per the November 20, 2013 State Water Resources Control Board letter, monitoring on refuge land will be required in order to demonstrate that the water quality objective for arsenic in the receiving groundwater is met "within the earlier of (i) 20 years after achieving the remedial action objective for chromium or (ii) 20 years after ceasing injection of the water containing naturally occurring arsenic at concentrations above the water quality objective." After the remedial action is complete, the remedy facilities will be decommissioned. An updated project schedule will be included in the 90% design and the future Remedial Action Work Plan.
How the use would be conducted—including techniques and equipment used, the number of people involved, routine operation and maintenance procedures	O&M procedures are described in Volume 1 of the Draft O&M Manual (Appendix L of the 60% BOD). Additional details will be provided for O&M of the freshwater supply in the 90% design, after a freshwater water well site is selected for the remedy. Additional details related to construction of the remedy will be included in the future Remedial Action Work Plan.
What would be the anticipated impacts—identifying and describing the impacts; citing available sources of information (plans, environmental assessments, narratives, research, state plans, field experience, consultation with others); distinguishing between long-term and short-term impacts; documenting direct, indirect, and cumulative impacts on refuge resources	Section 2.4 (Other Site Conditions Affecting Design) of the 60% BOD report describes the baseline site conditions that affect remedy design. Among the documented conditions related to ecological resources at the site are surface water and wetlands, vegetation communities, special status plants, and special status wildlife, avian, and aquatic species. A series of maps were provided in Section 2.4 that overlays the remedy features on surveyed ecological resources – notably Figure 2.4-5 (Jurisdictional Waters and Wetlands), Figure 2.4-9 (Vegetation Communities), Figure 2.4-10 (Habitat of Desert Tortoise Species), and Figure 2.4-11 (Indigenous Plants of Traditional Cultural Significance). PG&E, USFWS, and DOI are coordinating on the Programmatic Biological Assessment (PBA) for the final groundwater remedy. The ESA Section 7 consultation will be completed prior to the approval of the Construction/Remedial Action Work Plan. Measures outlined in the forthcoming PBA and associated USFWS determination will be implemented before and during construction activities. Biological completion reports will be submitted to USFWS documenting areas of impacts and monitoring of construction activities.

	Impact analysis for proposed construction and operation activities are also described in the EIR Section 4.3.3.3 and include: BIO-1 – Potential Fill of Wetlands and Other Waters of the US or removal of Riparian Habitat; BIO-2 – Direct Disturbance of and Loss of Habitat for Special-Status Birds and Desert Tortoise; and BIO-3 Fish Mortality, Interference with Spawning Habitat, and Other Adverse Effects. Of these, only BIO-1 and BIO-2 are related to the proposed activities. The certified EIR summarizes results from site-specific surveys that were conducted for Southwestern willow flycatcher, Mojave desert tortoise, Yuma clapper rail, and other avian species which were also identified during these surveys. Implementation of the EIR mitigation measures would reduce all of these impacts to a less-than-significant level. Subsequent studies have been conducted to document the type and extent of jurisdictional wetlands and waters of the US (Wetland Delineation Report, Aug 2013); as well as the type and location of rare and protected plants (Floristic Survey Report, Aug 2013) and culturally significant plants (Ethnobotany Survey Report, Aug 2013). Additional survey for lycium and arrowweed was conducted in response to comment #311 DOI0140. Potential impacts to sensitive resources during remedy implementation will be documented as required by the EIR. Additionally, applicable cultural resource mitigation measures included in the Programmatic Agreement (PA) (BLM 2010), Cultural and Historic Properties Management Plan (CHPMP) and the EIR Section 4.4 are being and will continue to be implemented to avoid, minimize, or mitigate adverse effects to cultural and historic properties on refuge land.
What mitigation is planned for loss of functional value of refuge while use is in operation	The future Remedial Action Work Plan will include a Habitat Restoration Plan in compliance with the CD, Appendix C (Scope of Work), Article 3. PG&E is committed to working with DOI and the HNWR beginning in 2014, on mitigation planning for potential loss of functional value of the refuge while use is in operation.
How and when the actions/facilities would be closed out—including restoration plans	In compliance with the CD, Appendix C (Scope of Work), Article 9, the Remedy Decommissioning Plan will include procedures for the removal and decommissioning of the groundwater remedy. The Plan will also incorporate planning/approaches for post-remedy restoration (including, but not limited, to a series of photo points). This future Plan will be submitted to DOI within 120 days of DOI's certification of completion of the remedial action and a determination by DOI that removal of such facilities is protective of human health and the environment. In addition, the future Remedial Action Work Plan will include a Habitat Restoration Plan in compliance with the CD, Appendix C (Scope of Work), Article 3.

What contingency plans will be in place—identifying actions that will be taken should an accident, unintended discharge, etc. occur.	Contingency Plans are described in Volume 3 of the Draft O&M Manual of the 60% BOD report. Additional details on Contingency Plans for the Remedy Construction will also be included in the future Remedial Action Work Plan.

Attachment C: RTC #39

Alternate Piping Routes near the ER-6 Area

ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY

REVISIONS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY

REVISIONS

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	SUPV	
	DSGN	BAS
	DWN	AJW
	CHKD	
	OK	
	DATE	
	SCALES	1" = 30'

GAS TRANSMISSION & DISTRIBUTION

PACIFIC GAS AND ELECTRIC COMPANY

SAN FRANCISCO, CALIFORNIA

MICROFILM	
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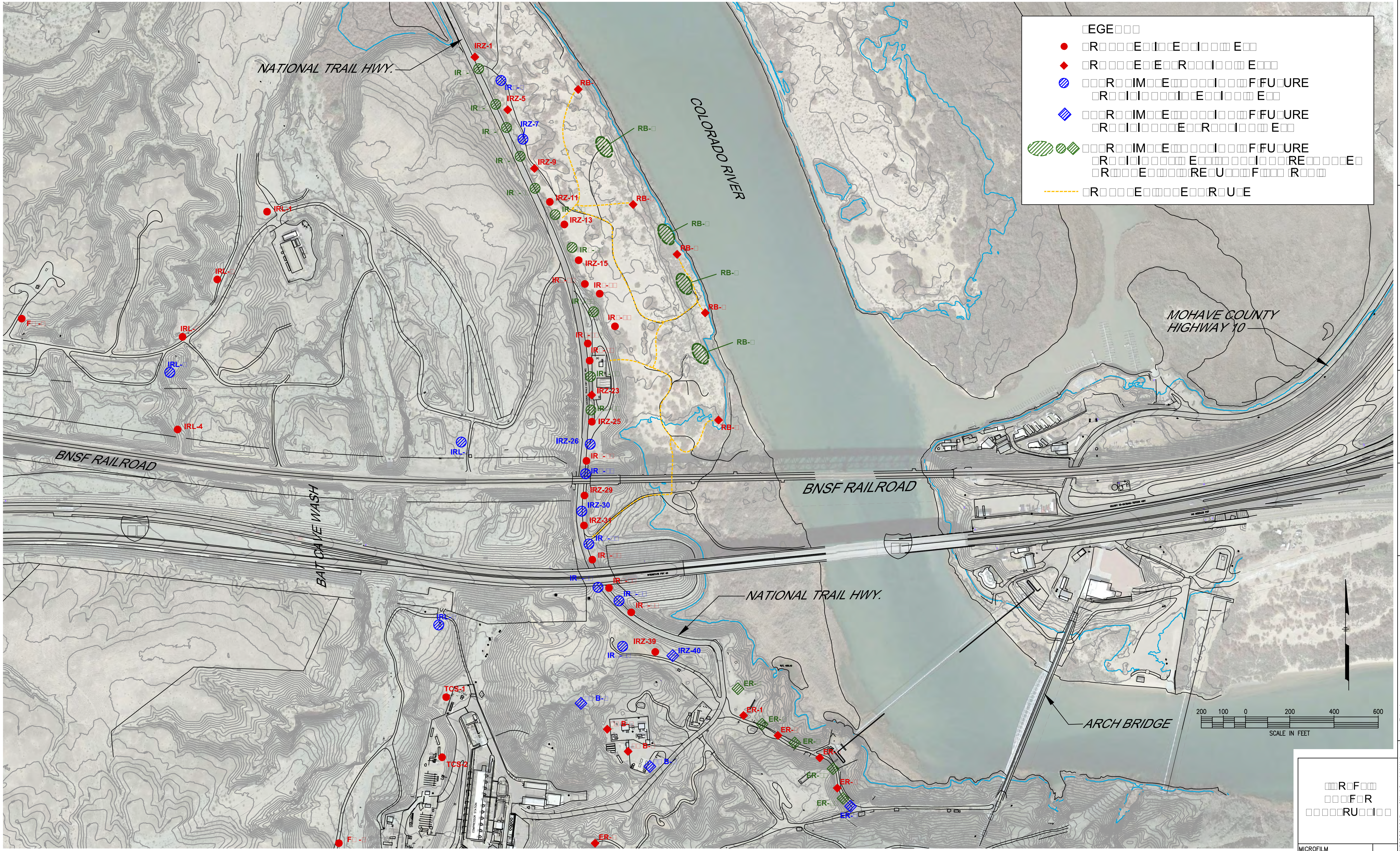
SUPSD BY	
SHEET NO. of SHEETS	REV

N1808

Attachment D: RTC #84a/b, #100, #109, #135

Proposed Locations for Future Provisional Wells



ETIC ENGINEERING

ARCADIS

NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY	NO.	DATE	DESCRIPTION	GM/SPEC	DWN	CHKD	SUPV	APVD BY
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DWN	AJW
CHKD	
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DATE	
SCALES	1" = 200'

GAS TRANSMISSION & DISTRIBUTION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

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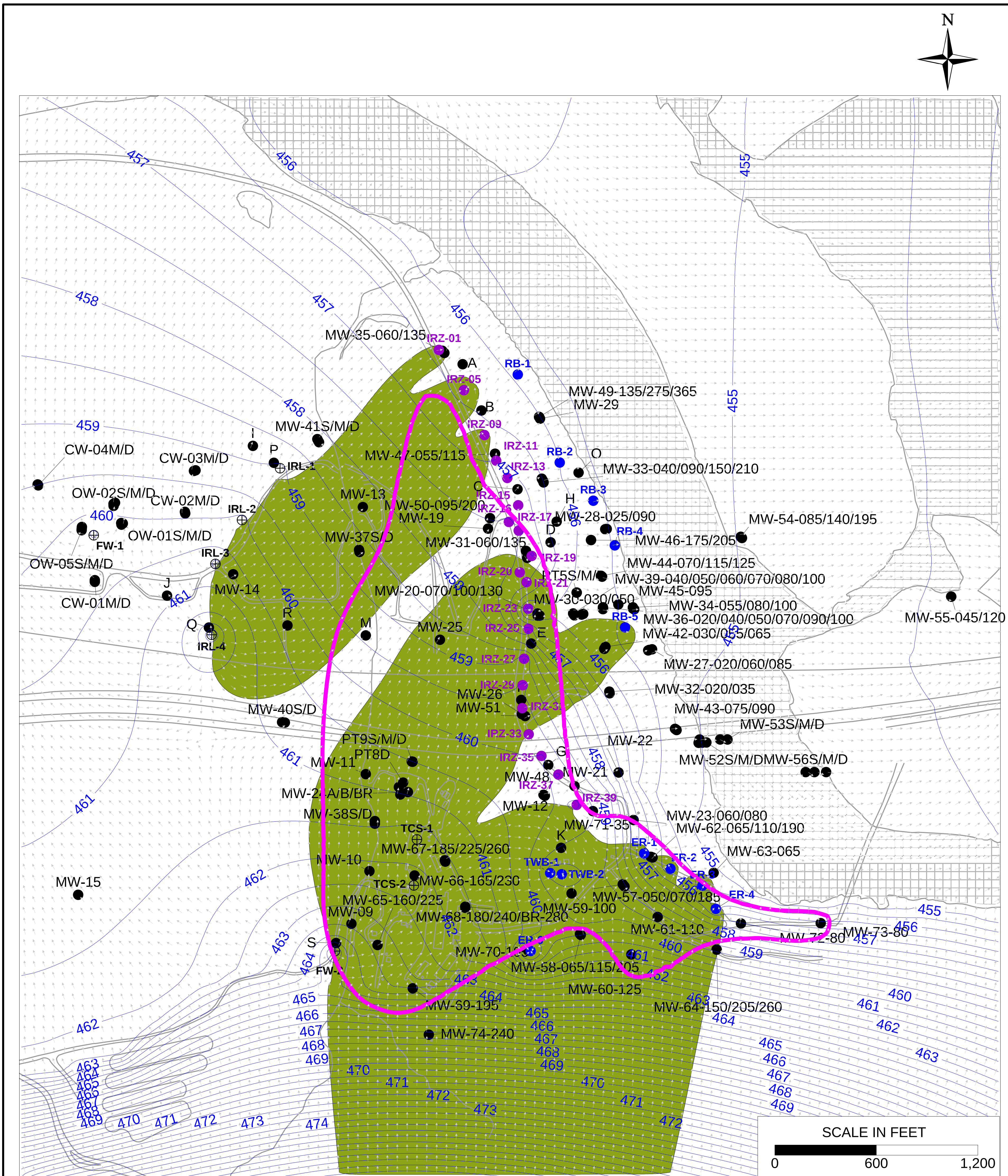
N1808

Attachment E: RTC #99, #216, #646, #659, 683, #692

Simulated Groundwater Flow and Capture Figures



LEGEND

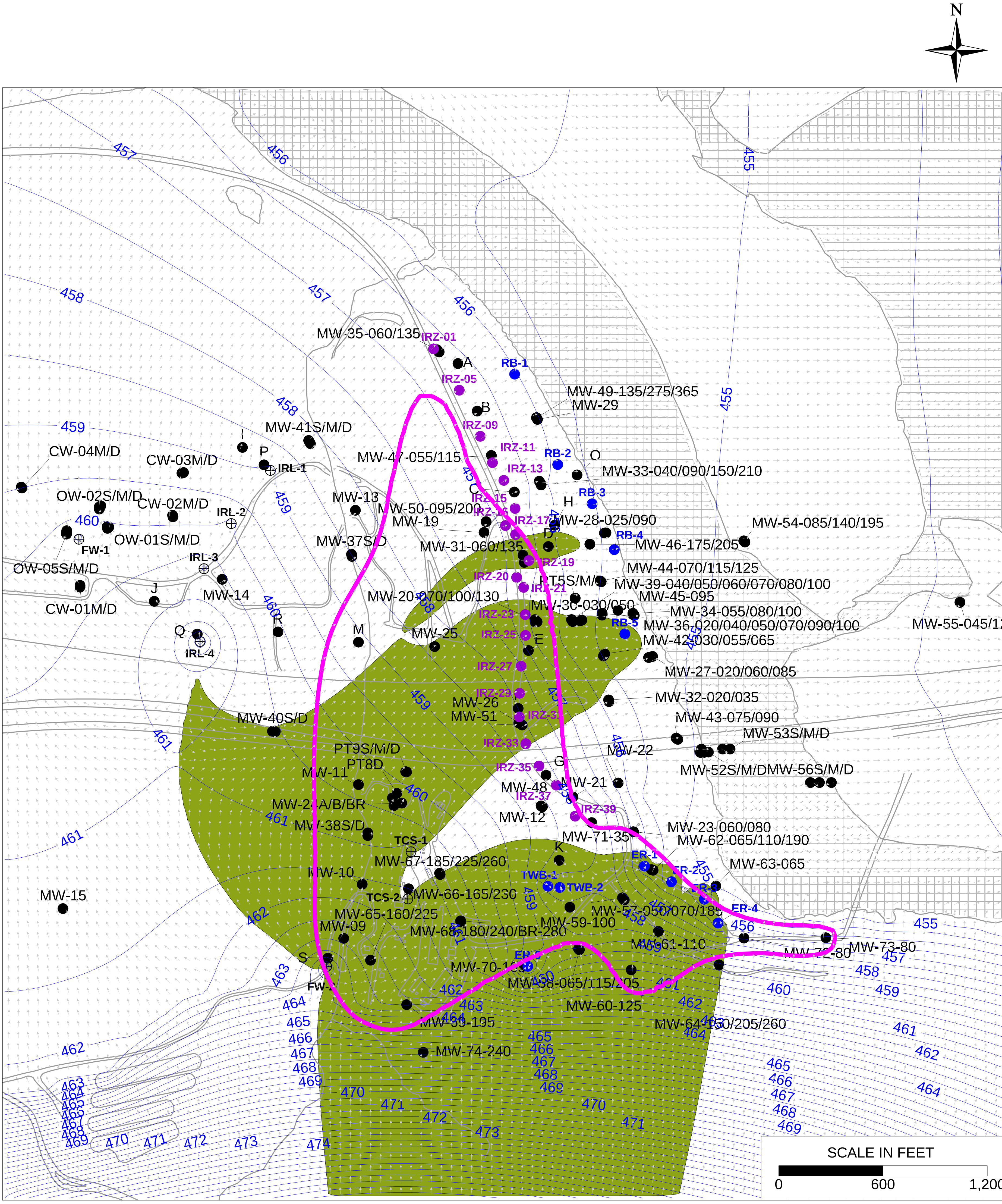
- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- SIMULATED GROUNDWATER CAPTURE ZONE
- SIMULATED GROUNDWATER FLOW VECTOR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND CAPTURE MODEL LAYER 1 - NTH IRZ ON

ARCADIS

FIGURE
1A



LEGEND

IRZ WELLS

UPGRADIENT INJECTION WELLS

EXTRACTION WELLS

MONITORING WELLS

460 SIMULATED GROUNDWATER LEVELS (FT MSL)

ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR

SIMULATED GROUNDWATER CAPTURE ZONE

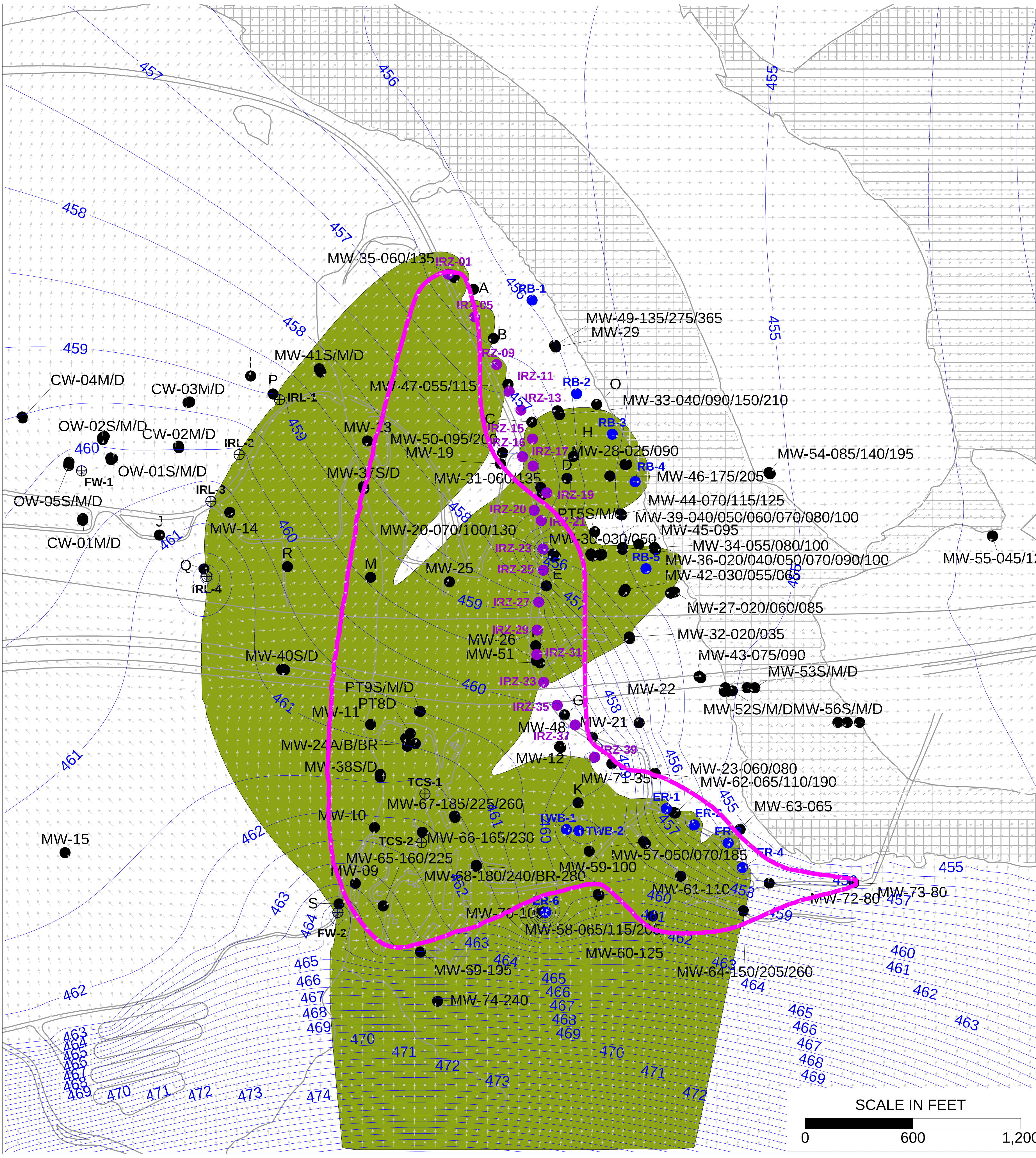
SIMULATED GROUNDWATER FLOW VECTOR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND CAPTURE MODEL LAYER 1 - NTH IRZ OFF

ARCADIS

FIGURE
1B



LEGEND

IRZ WELLS

UPGRADIENT INJECTION WELLS

EXTRACTION WELLS

MONITORING WELLS

460 SIMULATED GROUNDWATER LEVELS (FT MSL)

ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR

SIMULATED GROUNDWATER CAPTURE ZONE

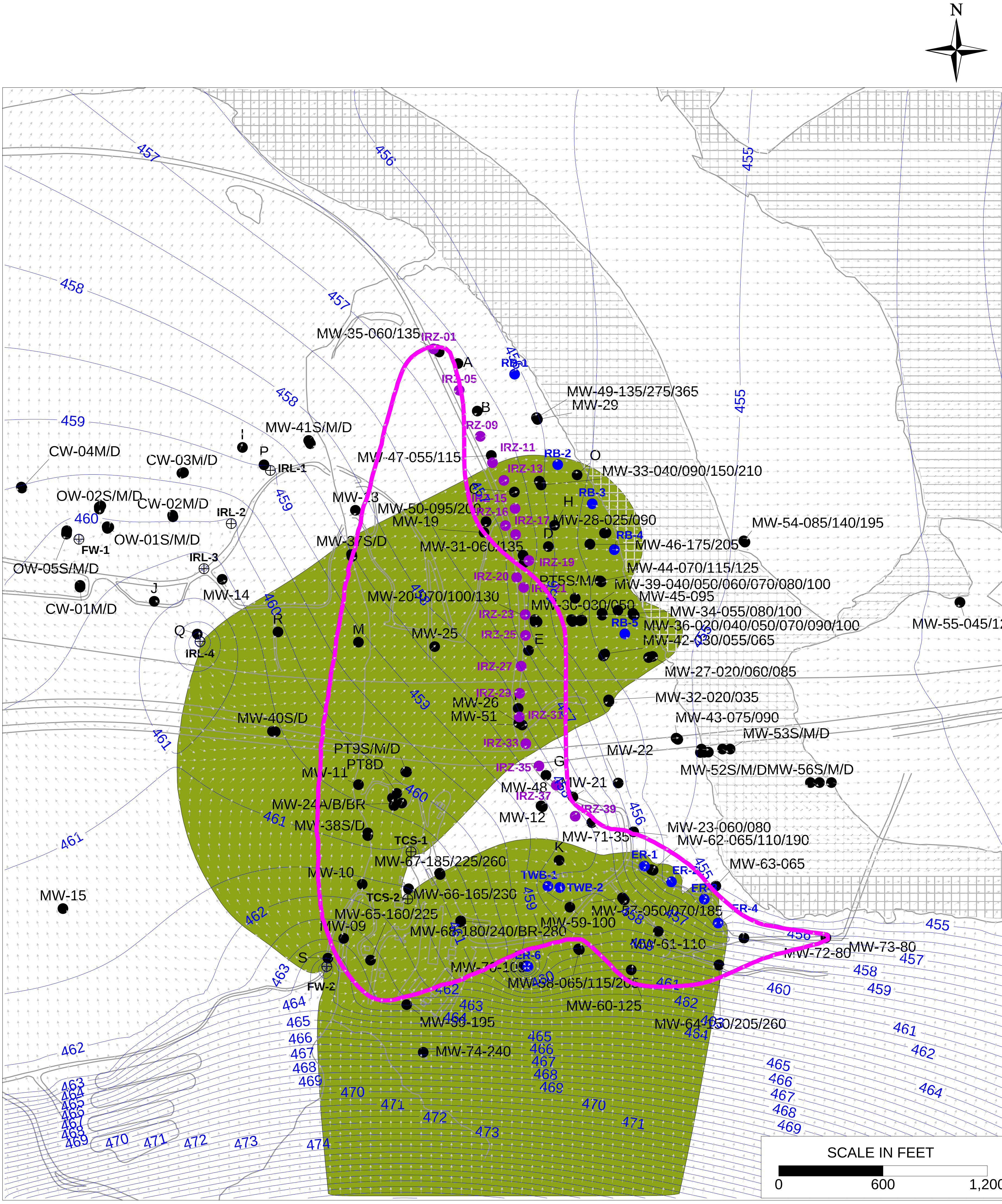
SIMULATED GROUNDWATER FLOW VECTOR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND CAPTURE
MODEL LAYER 2 - NTH IRZ ON

ARCADIS

FIGURE
2A



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
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PG&E
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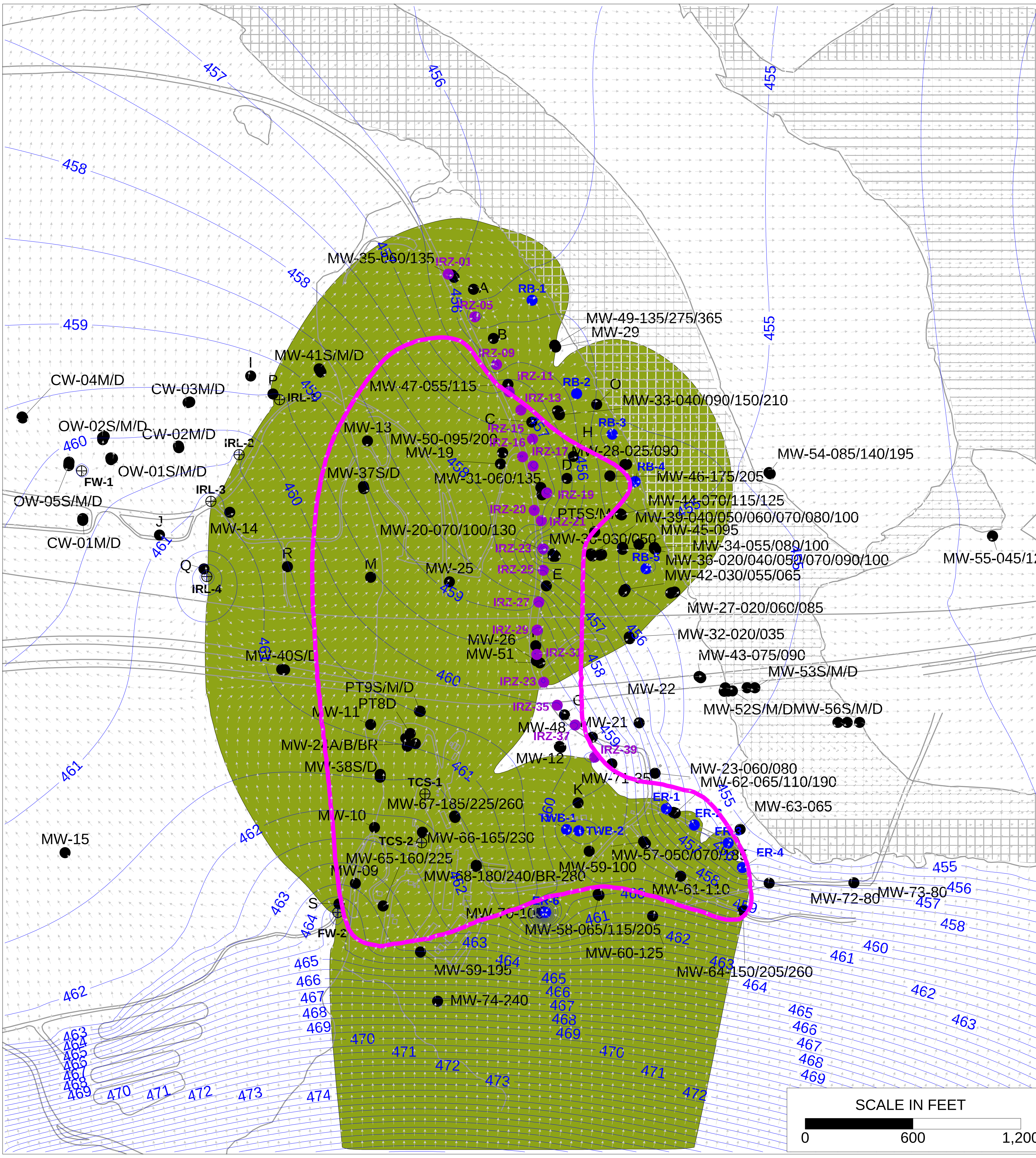
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND CAPTURE MODEL LAYER 2 - NTH IRZ OFF

ARCADIS

FIGURE
2B



LEGEND

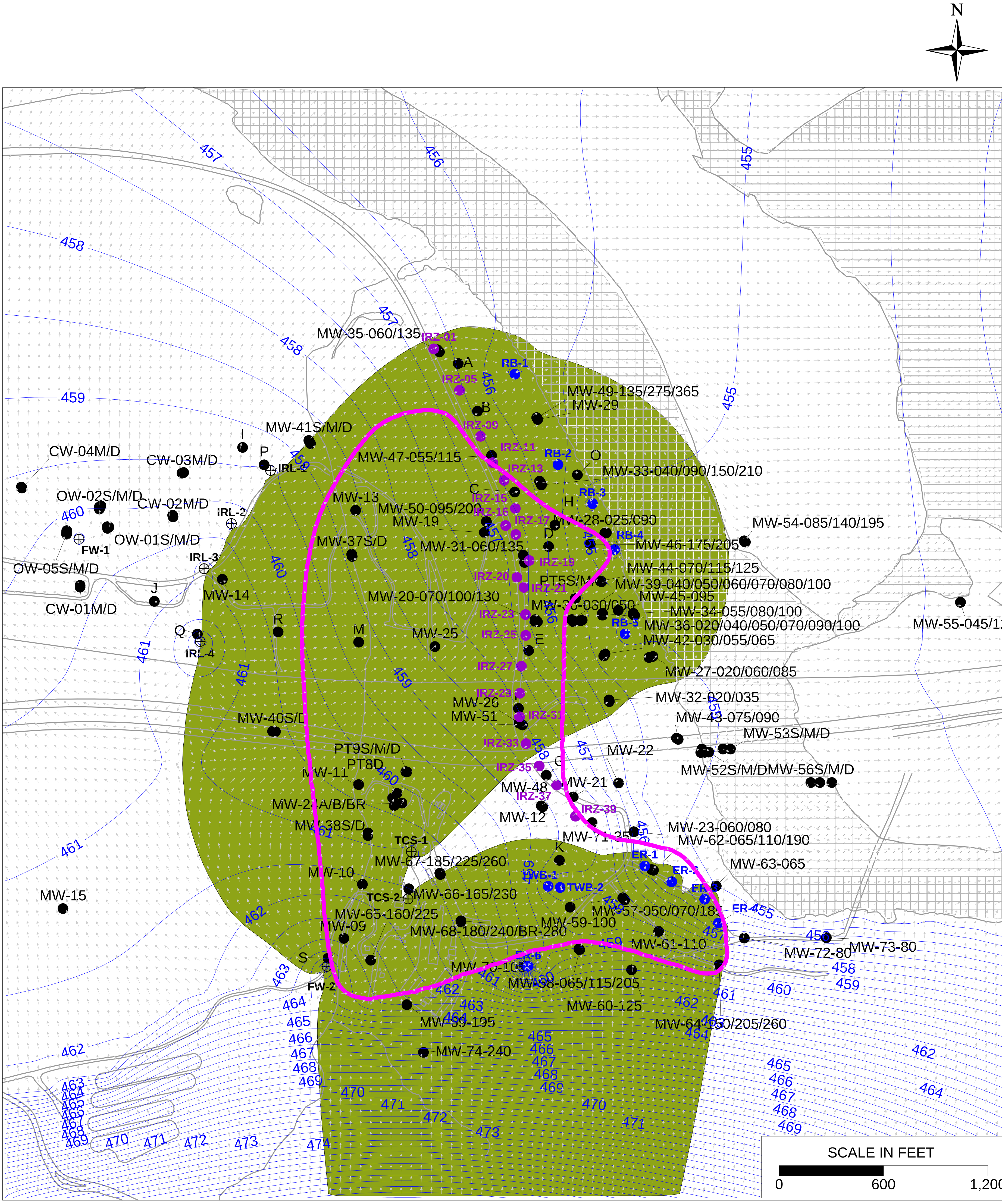
- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- SIMULATED GROUNDWATER CAPTURE ZONE
- SIMULATED GROUNDWATER FLOW VECTOR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND CAPTURE MODEL LAYER 3 - NTH IRZ ON

ARCADIS

FIGURE
3A



<u>LEGEND</u>

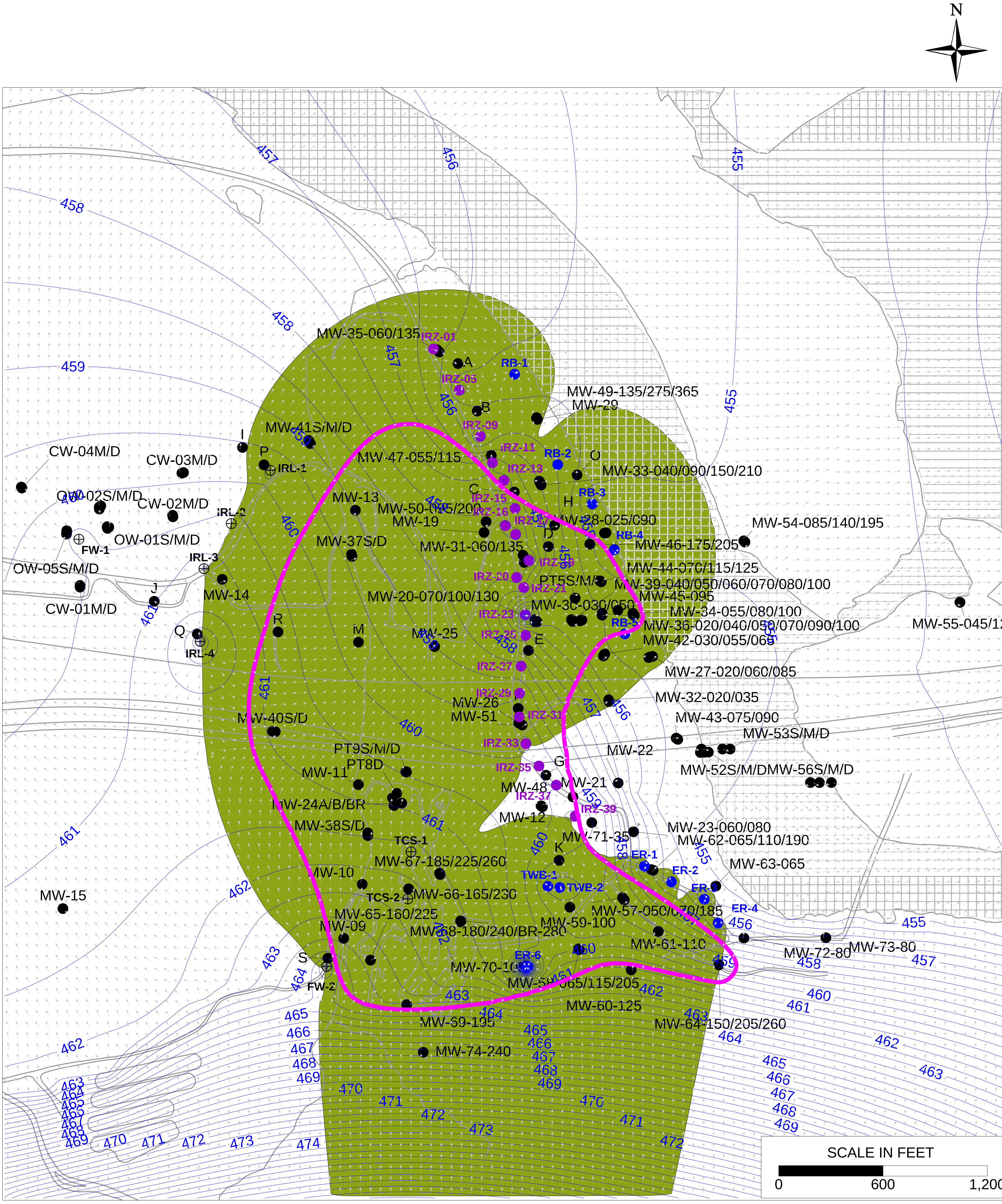
- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- SIMULATED GROUNDWATER CAPTURE ZONE
- SIMULATED GROUNDWATER FLOW VECTOR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND CAPTURE MODEL LAYER 3 - NTH IRZ OFF

ARCADIS

FIGURE
3B



LEGEND

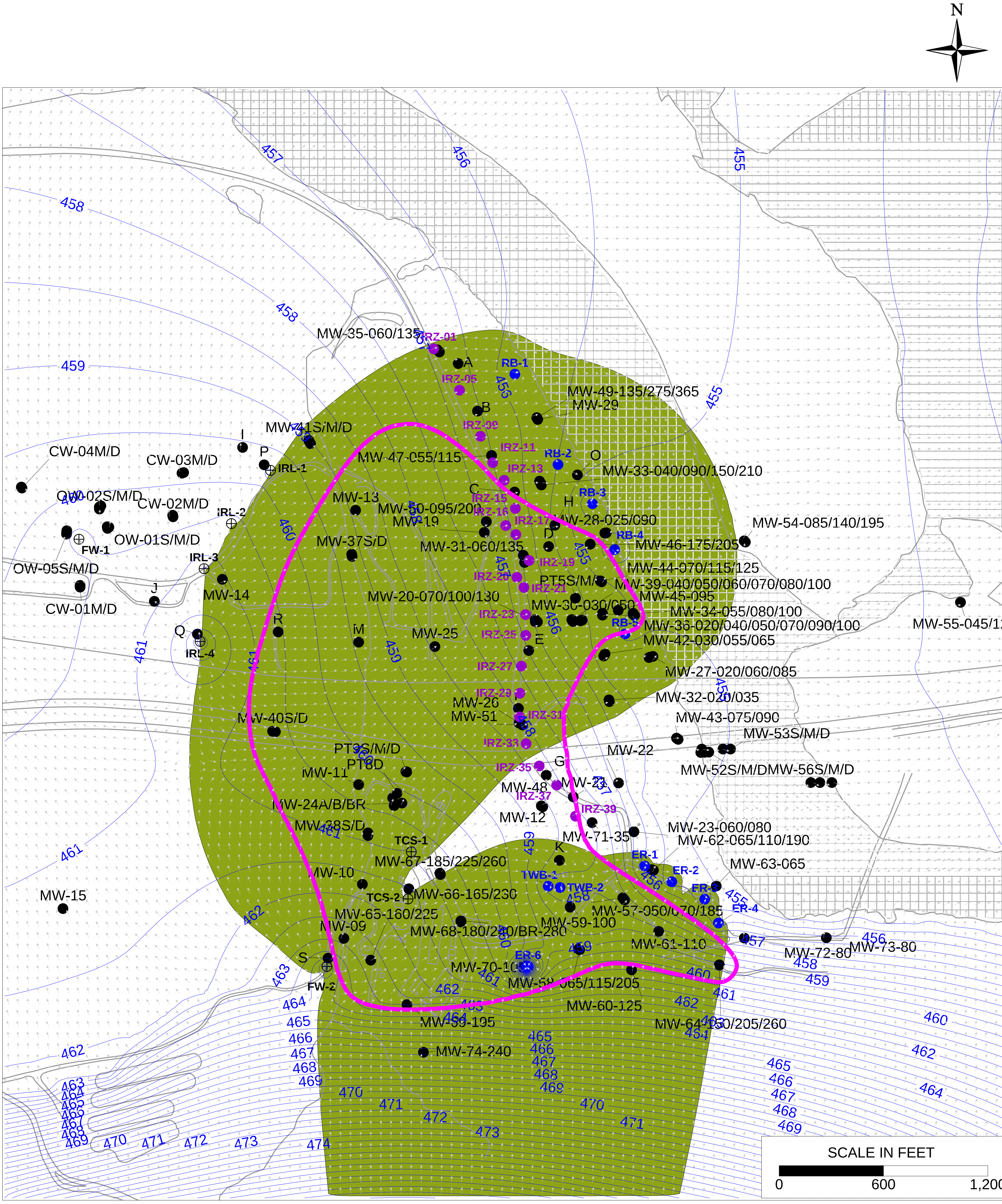
- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- SIMULATED GROUNDWATER CAPTURE ZONE
- SIMULATED GROUNDWATER FLOW VECTOR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE
GROUNDWATER FLOW AND CAPTURE
MODEL LAYER 4 - NTH IRZ ON

ARCADIS

FIGURE
4A



LEGEND

IRZ WELLS

UPGRADIENT INJECTION WELLS

EXTRACTION WELLS

MONITORING WELLS

460 SIMULATED GROUNDWATER LEVELS (FT MSL)

ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR

SIMULATED GROUNDWATER CAPTURE ZONE

SIMULATED GROUNDWATER FLOW VECTOR

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND CAPTURE MODEL LAYER 4 - NTH IRZ OFF

ARCADIS

FIGURE 4B

Attachment F: RTC #168, #178, #816-845

Freshwater Pre-injection Treatment System Design Basis

Addendum to Freshwater Pre-injection Treatment System Design Basis, PG&E Topock Compressor Station, Needles, California

PREPARED FOR: Pacific Gas and Electric Company

PREPARED BY: CH2M HILL

DATE: December 5, 2013

1.0 Introduction

Since the submittal of the 60% design (CH2M HILL 2013), the State Water Resources Control Board (State Board) has issued a decision letter on November 20, 2013, and DTSC has provided direction in its comment on the 60% design (#145 DTSC-50) that the design criteria for the potential future pre-treatment of freshwater at Topock will be limited to arsenic removal only and will be included in the 90% design only as a contingency. In compliance with this recent DTSC's directive, this technical memorandum presents the design basis for a potential future pre-treatment option for freshwater.

This pre-treatment option assumes that the primary source is groundwater from a well in Arizona and the secondary source is water from the current PG&E Topock Compressor Station (TCS) source wells (Topock-2/3). This assumption will be revisited after completion of the alternative freshwater source evaluation—the field work is currently under way. The potential future treatment system, referred to herein as the freshwater pre-injection treatment system (FWPTS), will be located in the vicinity of the planned remedy-produced water-conditioning plant. All components of the FWPTS are located on previously disturbed areas within the PG&E-owned parcel.

The treatment goals of the FWPTS are arsenic removal to concentrations less than the federal and California maximum contaminant level (MCL) of 10 micrograms per liter (µg/L) (California Department of Public Health, 2013). This technical memorandum discusses the evaluation of available treatment technologies for arsenic; the selection of technologies for bench-scale testing; the results from bench-scale testing at CH2M HILL's Applied Science Laboratory (ASL) in Corvallis, Oregon; and the design basis/design criteria for the FWPTS. This document also includes a process flow diagram, a preliminary equipment layout, and a preliminary list of key equipment.

The design information presented herein has been developed based on Topock-specific information (that is, bench-scale testing results of HNWR-1 water) and experience in designing and operating arsenic groundwater treatment systems on non-Topock projects. Because of its location, the potential future FWPTS will be designed to achieve a safe, harmonious, and sustainable operation within TCS. Engineering efforts are being conducted and design details of the FWPTS will be included in the 90% design.

2.0 Freshwater Water Quality, Treatment Goals, and Design Flow Rates

For the purpose of this conceptual design, it is assumed that the water quality from the future supply well in Arizona is similar to that of the HNWR-1 well. PG&E has collected and analyzed six samples from HNWR-1 starting in November 2010. Analytical results from November 2010 through January 2013 indicate that the naturally-occurring arsenic concentrations in HNWR-1 water were 15-16 µg/L, greater than the federal and California MCL of 10 µg/L arsenic. The average concentration of arsenic in Topock-2 was 12.3 µg/L (CH2M HILL 2009) and in Topock-3 was 14 µg/L (CH2M HILL 2013). Table 1 summarizes available arsenic results for HNWR-1 and Topock-2/3 wells. As previously mentioned, the treatment goals for the FWPTS are to remove arsenic to concentrations less than 10 µg/L.

The total freshwater supply flow rates are based on the sum of the modeled freshwater flows into the Freshwater and Inner Recirculation Loop injection wells. The FWPTS will be designed to treat freshwater for remedy injection only. Exhibit 1 shows the FWPTS design flow rates.

EXHIBIT 1
Design Flow Rates
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum
PG&E Topock Compressor Station, Needles, California

Element	Unit	Minimum Flow	Nominal Flow	Maximum Flow
Freshwater Pre-Injection Treatment System (FWPTS)	gpm	150	450	900

3.0 Evaluation and Selection of Treatment Technologies

For this conceptual design basis, PG&E has identified and evaluated proven treatment technologies for arsenic that are United States Environmental Protection Agency (USEPA) Best Available Technologies and have been successfully used by municipalities and industry. Unproven technologies or technologies that have not been used in full-scale applications were not considered.

The initial list included nine technologies: anion exchange, activated alumina (AA) adsorbents, reverse osmosis (RO), electrodialysis reversal (EDR), lime softening, distillation, iron-based adsorbents, titanium-based adsorbents, and coagulation/filtration (see Exhibit 2). These technologies were evaluated and screened in a two-step process: (1) the initial screening was based the experience of the engineering team with the individual technology, and (2) the second-level screening was based on a set of criteria - namely treatment effectiveness, reliability and flexibility, operational complexity, waste generation, footprint, and cost effectiveness. After completion of the technology screening and evaluation process, the AA technology with disposable and regenerable (AA) adsorptive media, coagulation filtration, and iron-based adsorbent granular ferric hydroxide (GFH) were selected for bench-scale testing. For more details of this screening and a description of the evaluation processes, see Appendix A.

EXHIBIT 2
Technologies Considered for Arsenic Removal
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California

Technology	Evaluation Status
Anion exchange	Screened out, significant waste generation.
AA	Selected for bench-testing
Titanium-based adsorbents	Screened out, similar as other adsorbents considered, with less experience.
Reverse osmosis (RO)	Screened out, significant waste generation.
Electrodialysis reversal (EDR)	Screened out, significant waste generation.
Lime softening	Screened out, significant waste generation.
Distillation	Screened out, significant energy use and capital cost.
Coagulation filtration	Selected for bench-testing
Iron-based adsorbents	Selected for bench-testing

4.0 Summary of Bench-scale Testing Results

The objectives of bench-scale testing were to: (1) verify the effectiveness of each adsorptive media in removing arsenic from HNWR-1 water to the treatment goals, (2) understand the time to break through (critical for equipment sizing and waste management) for AA and GFH, (3) understand effectiveness of coagulation with a jar test, and (4) understand waste generation amounts. This section summarizes the testing and results to date as it relates to arsenic treatment.

To accomplish the first two objectives, CH2M HILL's ASL employs a testing procedure for evaluating adsorptive media effectiveness in removing arsenic in a small-diameter laboratory column analogous to the rapid small-scale column test method developed for assessing granular-activated carbon in a continuous flow system. This method significantly reduces the amount of time and water required for testing compared to pilot-scale and full-scale systems (USEPA 1996). A jar test was performed to evaluate the effectiveness of ferric chloride as coagulant.

A groundwater sample was continuously pumped, sampled, and collected in three 55-gallon drums from HNWR-1 well in early January 2013 and was shipped to ASL for bench-scale testing. The groundwater sample was processed continuously through the column, and the treated water was sampled and analyzed for arsenic until breakthrough (defined as at least 70 percent of the average influent concentration). After the first breakthrough, the media was regenerated, and the test was repeated. Two treatment cycles (termed Service Cycle 1 and Service Cycle 2) were conducted for regenerable AA. Because of time constraints, not all media samples were able to be tested until breakthrough. In total, 133 liters of HNWR-1 well water were processed using disposable AA and 204 liters using GFH. These samples were tested for as long as time permitted in the laboratory. The rapid small-scale column test results provide information on adsorption capacity (extent of adsorption) and the rate of adsorption (adsorption kinetics), which are the two dominant factors affecting breakthrough in the media columns.

The rapid small-scale column test for arsenic removal was performed using the following media

- Regenerable AA (BASF AA-400G)
- Disposable AA (BASF AA-FS50)
- Alum-impregnated AA (AIAA)
- GFH

Prior to passing the water over the media, the groundwater was pretreated as follows: the pH was adjusted to 6.5 with hydrochloric acid and the water was injected with chlorine to maintain a residual concentration of 1 mg/L for 60 seconds (this is to oxidize any arsenite present in the water to arsenate), and was followed by inline filtration.

Column Testing Treatment Effectiveness and Time to Breakthrough

Figure 1 (located at the end of this memo) shows concentrations of arsenic in treated water versus the number of bed-volumes of groundwater passed through (one bed-volume is equivalent to the amount of adsorptive media in the column). During the first service cycle, the regenerable AA performs well, but in the second service cycle the effluent concentration begins to increase more rapidly indicating after the initial service cycle the media loses capacity to adsorb arsenic. Due to this fact and the difficulty in regenerating AA media which requires using strong chemicals like caustic and sulfuric acid, this method is eliminated from further analysis. The AIAA performed somewhat better than the regenerable AA, but not as well as the disposable AA media. The poorer performance and the additional effort to impregnate the alum onto the AA, eliminates this media from further evaluation. The disposable media performed well to more than 44,000 bed volumes, although the arsenic effluent concentration appears to have increased more than the effluent from the GFH media column.

To ascertain the relative performance of the two media, another figure was prepared (Figure 2), which shows the effluent concentration as a function of the amount of arsenic adsorbed on the treatment media. The effluent concentration in the disposable AA, begins to rise rapidly when the adsorption reaches 0.4 µg/mg media where as in the GFH varies between 0.15 and 0.35 µg/mg media until the test was stopped. These results more clearly indicate GFH will perform better.

Jar Testing Results

Jar testing was performed to test arsenic removal by coagulation with ferric chloride. Water samples were pre-oxidized with free chlorine dosed to provide approximately 1 mg/L free chlorine residual for 60 seconds prior to ferric chloride addition and mixing. Ferric chloride was added to reach doses 5, 10, 15, and 20 mg/L. The mixers were run at 70 revolutions per minute (rpm) for 30 seconds followed by 25 rpm for 20 minutes. The samples were then filtered through a 0.45 micron filter and the filtered water tested for arsenic and pH.

Figure 3 shows the arsenic concentration versus ferric chloride dose applied during testing. Jar testing demonstrated that arsenic could effectively be removed to <10 µg/L with ferric chloride dosed to 5 mg/L.

Process Selection

As shown above, the GFH was effective at removing arsenic to below the treatment goals (the federal and California MCL of 10 µg/L). The effluent remained less than 1 µg/L of arsenic for over 70,000 bed-volumes. The GFH media performed better than the disposable AA offering longer running periods between media change-outs. Coagulation and filtration although effective creates a solid waste stream that must be transported and disposed of off-site and is more difficult to operate. Based on these reasons, GFH was selected for the FWPTS design.

Section 5 discusses the treatment and backwash process in more details and provides a summary of the sustainability factors.

5.0 Freshwater Treatment Process and System Description

As previously mentioned, GFH was selected as the treatment technology to be carried forward into the design of the FWPTS. GFH is a granular, ferric-based, non-regenerative media that adsorbs arsenic and other heavy metal ion from solution. The USEPA has identified GFH as an effective media to remove arsenic (USEPA 2003). This section describes the design philosophy, the treatment process, and the system configuration envisioned at this stage. This section also discusses the uncertainties with the ongoing design and the work that is currently underway or being planned to address these uncertainties.

5.1 Treatment System Description

Groundwater will be pumped and conveyed from the future water supply well in Arizona to the remedy freshwater storage tank. Water will be pumped from this tank and will be injected with hypochlorite for arsenic oxidation and with acid to reduce pH to 6.5; both hypochlorite and lower pH improve arsenic removal in the media vessels. After chemical injection, water will be passed through bag or cartridge filters to remove solids that would otherwise clog the media, reducing performance and runtime. With the solids removed, the water will be divided into two or three streams (nominal or maximum flow) and each will be processed through a single treatment media vessel (configured in parallel) in a downward flow direction. Automatic valves will divert the flow to the proper vessels and will control the flow rate into each in service vessel. During nominal flow, the third and fourth treatment media vessel will be in standby mode. During maximum flow, three treatment media vessels will be operating. Prior to backwashing a vessel, a standby vessel will be brought on line and the first vessel requiring backwash will be put into standby. The remaining in service vessels will be backwashed in turn.

PG&E is evaluating dechlorination alternatives to remove residual chlorine from the treated freshwater. Dechlorination is often accomplished by addition of chemicals such as ascorbic acid, calcium thiosulfate, and hydrogen peroxide. The equipment would involve chemical storage drums or totes, metering pumps, and an inline static mixer. The proposed FWPTS location has sufficient space for this equipment. Additional details will be provided as part of the 90% design submittal.

5.2 Media Backwash & Replacement Process

The amount of wastewater generated is primarily a function of backwash frequency. Backwashing prevents over compaction of the media bed enabling good flow conditions. The media bed should be backwashed once a month for proper media maintenance. Backwashing occurs in an upflow mode, the reverse of normal forward down-flow operation. Once the backwash process is complete, normal forward down-flow operation may resume. Each media vessel backwash process is expected take ten minutes.

At some point during treatment operations, the media will lose its adsorptive capacity and will need to be replaced. Based on bench scale testing, this point is anticipated to be after more than 70,000 bed-volumes or about 8 months at maximum flow rates. The actual replacement frequency will be determined during full-scale operation. For the purpose of the conceptual design, it is assumed that the media will be replaced once a year. Spent media will be removed from each vessel and sent to a landfill. Prior experience operating GFH treatment process shows the spent media is not hazardous (Ela 2006). Waste characterization testing will be performed in accordance with state and federal requirements and facility waste acceptance procedures. Virgin media will be placed in the media vessel and normal forward down-flow operation may resume.

Wastewater & Solid Waste Generation

The volume of wastewater needing to be managed is estimated based on the following assumptions:

- Backwash rate is 15 gpm/sq. ft. and vessel cross section area is 50 sq. ft.
- Backwashing time is 10 minutes resulting in 7,550 gallons per backwash
- Four vessels backwashed monthly at 900 gpm and two vessels backwashed monthly at 450 gpm
- 95 percent of the backwash water is recycled to the beginning of the process

At 450 gpm – 7,550 gallons/backwash x 2 vessels per month x 12 months per year x 5% = 9,000 gallons per year

For 900 gpm – 7,550 gallons/backwash x 4 vessels per month x 12 months per year x 5% = 18,000 gallons per year

The remaining (5 percent of the) backwash water can be discharged to the cooling tower makeup, the TCS evaporation ponds, or disposed offsite at permitted facilities. There is no need to treat or neutralize the pH of the discharged backwash water as it will be within acceptable ranges. Treated water is used for backwashing and no arsenic desorbs from the media during the backwashing process. Discharged backwash water will have more solids compared to the treated water but it will be able to be used for cooling tower makeup, TCS evaporation ponds, or disposed offsite without treatment.

Periodic disposal of the spent GFH media would be required also as a solid waste stream. Based on the bench testing, this would be no more frequently than every 8 months, but is expected to be less frequent. For the purposes of this conceptual design, it is assumed that the media will require annual replacement. The mass of solid waste to be managed

- The media has a specific gravity of 1.1 with water density of 62.4 pounds per cubic foot

- Each vessel has 200 cubic feet of media
- Four vessels need replacement at a rate 900 gpm and 2 vessels at a rate of 450 gpm

At 450 gpm – 200 cubic feet/vessel x 2 vessels per year x 1.1 x 62.4 pounds per cubic foot / 2,000 tons/pound = 13.7 tons per year

At 900 gpm – 200 cubic feet/vessel x 4 vessels per year x 1.1 x 62.4 pounds per cubic foot / 2,000 tons/pound = 27.5 tons per year

5.3 Chemical and Media Use

Chemicals will be used in the treatment system. Chlorine in the form of calcium hypochlorite tablets is used to oxidize arsenite to arsenate. Arsenate is more readily removed by the treatment process. Acid is used in pretreatment to improve adsorption by lowering the pH to about 6.5. Dechlorination of the treated water is under consideration and will be developed further for the 90% design submittal. The estimated chemical use is shown in Exhibit 3.

EXHIBIT 3
Annual Chemical Usage Rates
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum
PG&E Topock Compressor Station, Needles, California

Flow Case	Flowrate, gpm	Hypochlorite, pounds/year	93% Sulfuric Acid, gallons/year	Dechlorination Chemical[a]
Nominal	450	3,500	5,150	TBD
Maximum	900	7,000	10,300	TBD

a. Typical dechlorination agents include ascorbic acid, calcium thiosulfate, and hydrogen peroxide.

5.4 Sustainability Summary

For each of the treatment plant operating scenarios (450 and 900 gpm), sustainability parameters such as waste generation, chemical usage, energy use, and greenhouse gas emissions were estimated for the FWPTS as shown on Exhibit 4.

EXHIBIT 4
Sustainability Summary [a]
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California

				Operations					Construction	
Treatment Case	Chemical Truck Trips	Solid Waste Truck Trips	Electricity, kw-hr/yr	Wastewater Generation, MG/yr	Solid Waste Generated, tons/ year	Chemical Use, gal/yr	Total Miles/ year	Emissions, CO2 eq, Tons/year [b]	CO2 eq, Tons [c]	Footprint, sf [d]
450 gpm	14	2	280,000	Minimal	18	20,000	5,000	180	210	2,400
900 gpm	27	~3	320,000	Minimal	35	40,000	10,000	200	250	3,900

Notes: Units: kw-hr/year = kilowatt-hours per year; MG/yr = million gallons per year; gal = gallons; sf = square feet; gpm=gal per minute; CO2 eq – carbon dioxide equivalent

a: Previously submitted on March 29, 2013. Additional effects for using a dechlorination agent if required will be added to this table in the 90% design submittal.

b: Operational emissions include vehicle emission and electricity generation

c: Construction includes site work, material delivery, and workers travel

d: Footprint based on foundations for building, process tanks, and chemical storage

5.5 Controls Philosophy

The system will be automated to reduce the need for continuous operator oversight. Electronic notifications will be sent automatically to on-site operators that notify them of system alarms, shutdown, or other issues. System automation will be controlled using a programmable logic controller that will communicate with the groundwater remedy supervisory control and data acquisition system. Pneumatic valves will be automated to control flow. Online pH, turbidity, and conductivity sensors will be incorporated to enable remote process monitoring and control. Arsenic cannot be monitored using an online analyzer. Grab samples will be collected periodically and analyzed using a bench top colorimetric instrument in the sample room (located in the Remedy Produced Water Conditioning Building or the Central Maintenance Facility) to monitor arsenic levels.

5.6 Other Related Systems and Infrastructure

Electricity will be provided from the compressor station in a new building located next to the Remedy Produced Water Conditioning Building. The new FWPTS location will have a heating, ventilation, and air conditioning (HVAC) system for only critical equipment such as electrical and controls equipment.

5.7 Design Philosophy/Uncertainties in Design

As previously mentioned, the FWPTS will be designed to achieve a safe, efficient, and sustainable operation within the compressor station over the anticipated decades-long life of the remedy. Most of the uncertainty in the design is related to the bed life and adsorptive capacity of the media. Based on bench testing, it is anticipated that the media will not need to be replaced before 70,000 bed volumes are processed– or every 8 months. The actual adsorptive capacity will need to be determined during full-scale operation and the result will greatly influence the amount of wastewater and solid waste generated by the process.

6.0 Design Information

Process calculations used to develop the design criteria were prepared using the conservative assumption that the treatment vessels each needed to be backwashed once a month and media replaced annually. Conceptual design information is presented in Tables 2, 3, and 4 and on Figures 4, 5, and 6 at the end of this technical memorandum. More detailed design information will be included in the 90% design.

7.0 References

California Department of Public Health. 2013. http://www.cdph.ca.gov/certlic/drinkingwater/Pages/MCLsandPHGs.aspx. Accessed March 22.

CH2M HILL. 2009. Groundwater Background Study, Steps 3 and 4: Revised Final Report of Results, PG&E Topock Compressor Station, Needles, California. November 6.

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Ela, Wendell P., and A. E. Saez. *Innovative Technologies for Arsenic Residuals Stabilization*. Publication. AWWA Research Foundation, 2006. Web.

United States Environmental Protection Agency (USEPA). 1996. *ICR Manual for Bench- and Pilot-Scale Treatment Studies.* EPA 814/B-96-003. April.

__________. 2003. *Design Manual: Removal of Arsenic from Drinking Water by Adsorptive Media,* EPA/600/R-03/019. March.

Tables

TABLE 1
Arsenic Concentrations in HNWR-1 and Topock-2/3 Wells
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California

HNWR-1 Well – As Concentration					
11/10/2010	2/23/2012	3/15/2012	4/4/2012	6/27/2012	1/22/2013
15μg/L	15μg/L	16μg/L	15μg/L	16μg/L	16μg/L
(Source: April 2013 Freshwater Pre-Injection Treatment System Design Basis Memorandum, Table 1)					
Topock-2 Well					
Average As concentration = 12.3 μg/L *(Source: November 2009 Groundwater Background Study Report, Table 2-9, Footnote 5)*					
Topock-3 Well					
Average As concentration = 14 μg/L *(Source: April 2012 Freshwater Sources Evaluation Technical Memorandum, Table 3-1)*					

TABLE 2
Design Criteria for Arsenic Treatment System
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California

Subject	Criteria	Comments/Reason
	OPERATIONAL CRITERIA	
Maximum Groundwater Injection Flow Capacity	900 gpm	
Minimum Groundwater Injection Flow Capacity	150 gpm	
Average Groundwater Injection Flow Capacity	450 gpm	
	SITE CIVIL	
Location	Designated freshwater treatment at PG&E Topock Compressor Station near Needles, California.	
Building Finish Floor Elevation	Finished first floor, Elevation 626 feet (NGVD88).	
Grading	Longitudinal Slopes: Minimum 1% away from structures (2% desirable).	
Vehicle Access	WB 50 (turning radius for semi-truck and trailer with 50-foot wheel base). HS 20 (wheel loading on access roadways and parking areas). 50-foot minimum turning radius. Designated site accommodates truck circulation. Roads will be constructed at new facility for maintenance activities.	Required for delivery of chemicals, pumps, motors, and fire vehicles.
Site Constraints	Proposed facility located within the boundary of the compressor station. Access to all critical compressor station facilities must be maintained.	No modifications to the perimeter site fence or entrance gate will be made.
Parking	No parking will be required for new facility.	
Pedestrian Traffic	Limited to paved roadways, sidewalks are not located between existing facilities.	
	PROCESS EQUIPMENT, MOTORS, VALVES, AND ANCILLARIES	
Remedy Freshwater Storage Tank		
Material	Steel	Welded steel in accordance with American Water Works Association Standard D-100. Internal coatings will be applied for corrosion resistance.
Number	One	
Capacity	10,000-gallons	Based on remedy design flow of 900 gpm and four freshwater supply well pump starts per hours plus provision for dead storage. Assumes fire water will be supplied by the existing freshwater storage tanks.

TABLE 2
Design Criteria for Arsenic Treatment System
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California

Subject	Criteria	Comments/Reason
Treatment Process	Pre-oxidation, influent pH adjustment, followed by ligand exchange with granular ferric hydroxide for arsenic removal. Periodic backwash of media with treated water and annual media replacement. Treated water may be dechlorinated to enhance remedy performance (see Dechlorination System below).	Design criteria listed below is what is expected from planned pre-purchase bid, but not a guarantee of what equipment will be selected. The information in this section will be verified during the detailed design.
Granular Ferric Hydroxide (GFH) Treatment		
Treatment Objective	Arsenic removal	
Number of Vessels	Four when operating a maximum flow: Four: three online, one on standby. Two online when operating at nominal flow;	
Residence Time	5 minutes empty bed contact time	USEPA guidance.
Vessel Height	10.5 feet overall	
Vessel Diameter	8 feet	4 to 8 gpm/ft^2 hydraulic loading.
Materials of Construction	Low-carbon steel with epoxy lining that is NSF 61 listed.	
Media	Granular ferric hydroxide	Siemens, Severn Trent, or equal
Performance Limits		
Effluent Arsenic Concentration	< 10 µg/L	
Wastewater Volume	9,000 – 18,000 gal/year	
Chlorine Feed System		
Chemical Feed System	One calcium hypochlorite tablet feeder system—HDXLPE (with oxidation resistant liner) mix tank, feed pump, tablet hopper, controller and panel with disconnect. Sized for 0.2 to 2 lbs/hour of chlorine. Three days' minimum tablet capacity.	Feed system located in a containment area.
Safety Equipment	One eyewash and shower unit	
Coatings/Finishes	Chemical resistant coatings in chemical areas	
Controls	Chemical flow meter flow rate and totalizer	
	Chemical feed pump speed control	
Sulfuric Acid Feed System		
Chemical Feed System	One 1,000-gallon carbon steel with baked phenolic lining. Desiccant drier installed on vent. Sulfuric acid tank with tank pad.	Tank will be located in a containment area. Weekly fill frequency is the design basis,
	One chemical feed skid with two controllable chemical feed pumps	Solution concentration will be 93%.
Safety Equipment	One eyewash and shower unit	
Coatings/Finishes	Chemical resistant coatings in chemical areas	
Controls	Chemical flow meter flow rate and totalizer	
	Chemical feed pump speed control	
Backwash Tank and Treated Water Tank		

TABLE 2
Design Criteria for Arsenic Treatment System
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum, PG&E Topock Compressor Station, Needles, California

Subject	Criteria	Comments/Reason
Material	Fiberglass Reinforced Plastic (FRP)	
Number	Two	
Capacity	10,000-gallons tanks	Backwash is anticipated to be just over 7,000 gallons per vessel – 10 minutes of backwashing at 15 gpm/ft^2. Backwash tank will have floating decanter or cone bottom to aid in solids recovery and improve backwash recycle rate. Selection to be made in 90 per cent design.
Dechlorination System		Agent and strength to be determined – likely substances include ascorbic acid, calcium thiosulfate, hydrogen peroxide.
Chemical Feed System	Drums or chemical tote compatible with dechlorination agent. One chemical feed skid with two controllable chemical feed pumps	Container will be located in a containment area. Monthly fill frequency is the design basis, It is assumed there is sufficient space for this equipment.
Safety Equipment	One eyewash and shower unit	
Coatings/Finishes	Chemical resistant coatings in chemical areas	
Controls	Chemical flow meter flow rate and totalizer Chemical feed pump speed control Inline static mixer	
Flow Meters		
Type	Magnetic	
Number	Nine	
Flow Control Strategy	FWPTS will receive raw water from the primary source wells into a new freshwater storage tank (10,000 gallons). The secondary source Topock-2/-3 wells will flow by gravity from the existing TCS storage tanks only when required.) A booster pump with variable frequency drive will vary the flow through the treatment plant to maintain set point water levels in the treated water tank and prevent pump operating when the remedy freshwater storage tank water levels are below the setpoint. Media vessel inlet control valves equalize flows through each vessel.	
Pressure Transmitters	Furnished before/after media vessels.	
Static Mixer		
Number	One (at the inlet)	
Diameter	One 10-inch	
Type	Wafer style with integral injection ports	
Piping Materials		

TABLE 2
Design Criteria for Arsenic Treatment System
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California

Subject	Criteria	Comments/Reason
Process	HDPE SDR 11 or CPVC Schedule 80, per ASTM D1784, ASTM D1785, and NSF/ANSI 14 and NSF 61 listed	
Treatment Media Vessel Manifold	HDPE SDR 11 or CPVC Schedule 80, per ASTM D178, ASTM D1785, NSF/ANSI 14 and NSF-61 listed	
Potable Water	Buried: Copper, Type K, per ASTM B88 Exposed: Copper, Type L, per ASTM B88 or CPVC Sch. 80	
Process Piping Installation	Major process piping headers will be installed in pipe trenches inside the treatment building and buried outside the building. Media vessel piping will be aboveground. Actuated valves will be installed above grade whenever possible.	
Remedy freshwater storage tank Interface	Inlet from Remedy freshwater storage tank	
	YARD PIPING	
Design Criteria	Appendix C, Basis of Design Report (CH2M HILL 2013)	
	CORROSION CONTROL	
Design Criteria	Appendix C, Basis of Design Report (CH2M HIL, 2013)	
	ARCHITECTURAL/STRUCTURAL	
Building Code	Appendix C, Basis of Design Report (CH2M HILL 2013)	
Building Design Concept	Single building adjacent to Remedy Produced Water Conditioning System	
Building Construction Materials	Appendix C, Basis of Design Report (CH2M HILL 2013)	
Loads	Appendix C, Basis of Design Report (CH2M HILL 2013)	
	HVAC	
Codes/Standards	Appendix C, Basis of Design Report (CH2M HILL 2013)	
Design Conditions		
Site Elevation	See Section C.2 Civil, Appendix C, Basis of Design Report (CH2M HILL 2013)	
Cooling Load Basis	Building envelope heat gain and internal heat gains from equipment.	
System Type		
Process Building	A space for electrical and controls equipment in the building will be ventilated and cooled by a packaged air conditioning unit (Appendix C, Basis of Design Report [CH2M HILL 2013]). A thermostat will be located near the electrical controls and will maintain the desired temperature in that area.	

TABLE 2
Design Criteria for Arsenic Treatment System
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum, PG&E Topock Compressor Station, Needles, California

Subject	Criteria	Comments/Reason
	PLUMBING	
Lavatory/Toilet Room	No facilities provided.	
Potable Water	Emergency shower/eye wash stations.	Per 2010 California Plumbing Code, and ANSI Z358.1.
Non-potable Water	The non-potable water supply will have a reduced pressure backflow preventer. Non-potable water will be supplied for wash down water. Wash down hose valves, hoses and hose racks will be furnished in the area as required.	Per 2010 California Plumbing Code.
	ELECTRICAL	
Electrical Load	The electrical load will consist of process pumps, motor operated valves, filter system, control panel and instrumentation, building HVAC, convenience receptacles and interior and exterior lighting. Power distribution will be sized in accordance with NFPA 70 (National Electric Code) to operate process and facility loads. Short-circuit current interrupting capacity of power distribution equipment will be coordinated with existing power distribution system.	.
Service Voltage	480V, 3-phase, 3-wire power will be supplied from XFMR 099	
Utilization Voltage	Appendix C, Basis of Design Report (CH2M HILL 2013)	
Redundancy Requirements	Power distribution system redundancy will be limited to equipment supporting the operation of back-up process and facility equipment (i.e. motor control combination starters, and breakers,). Power distribution system for FWPTS will incorporate spare breakers and fuses. Supporting quick replacement of failed components. Backup power by diesel generator located at Transwestern Bench.	.
Manufacturers of Electrical Equipment, Grounding, Lightning Protection, Illumination, Emergency Lights, Stand-by/Backup Power, Raceways, and Duct Banks	Appendix C, Basis of Design Report (CH2M HILL 2013)	
	SECURITY	
Security	None	All security covered through TCS main facility

TABLE 2
Design Criteria for Arsenic Treatment System
*Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California*

Subject	Criteria	Comments/Reason
	CONTROL AND TELEMETRY	
Control and Telemetry Design Criteria	The treatment vessels will be a packaged system with the equipment manufacturer providing a fully configured programmable logic controller based system control panel with panel-mounted operator interface terminal. The control panel will be specified with an uninterruptible power supply to provide true online conditioned power sized to operate the connected load for 30 minutes.	
Communications, Other Networks, Supervisory Control and Data Acquisition, Instrumentation	Appendix C, Basis of Design Report (CH2M HILL 2013)	
Environmental Requirements	Equipment and instrumentation will be suitable for the following conditions: Air-conditioned Spaces: 10°C to 35°C and a relative humidity of 10 to 80 percent. Non-air-conditioned Spaces: 0°C to 50°C and a relative humidity of 10 to 95 percent. Outdoors: 0°C to 60°C and a relative humidity of 5 to 100 percent.	Environmental controls, such as heaters, fans, and air conditioning will be provided to maintain equipment within the operating conditions recommended by the manufacturer.
Standards/References	Appendix C, Basis of Design Report (CH2M HILL 2013)	

TABLE 3
Major Equipment List
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California

Quantity	Name	Description
4	Treatment Media Vessels	8-feet-diameter low-carbon steel with epoxy lining (9 - 18 gpm/ft^2 hydraulic loading rate)
1	Hypochlorite Feeder	Calcium hypochlorite tablet feeder: HDXLPE (with oxidation-resistant liner) mix tank, feed pump, tablet hopper, controller, and panel with disconnect
1	Sulfuric Acid Tank	1,000-gallon, (93% sulfuric acid), desiccant drier installed on vent. Baked phenolic lining on steel.
1	Acid Feed System	Pre-engineered skid with two chemical metering pumps for 93% sulfuric acid (0.5 to 2 gph)
1	Dechlorination System	To be determined – Pre-engineered chemical feed skid, storage tote or drum, and static mixer.
1	Pre-treatment Wafer-Style Static Mixer	With integral injection ports
2	Booster Pumps	Centrifugal pump with variable frequency drive
3	Filters skids with replaceable elements	Package unit with differential pressure indication and alarm. Bag or cartridge type
2	Backwash Recycle Pumps	Centrifugal pump with VFD
2	Backwash Pumps	Centrifugal pump 755 gpm (15 gpm/ft^2 hydraulic loading rate) with VFD
2	Treated Water Pumps	Centrifugal pump with VFD

TABLE 4
Mass Balance Table
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum, PG&E Topock Compressor Station, Needles, California

DRAFT

Stream # (see Figure 4)	1	2	3	4	5	6	7	7d
Waste Stream	Downstream of the Booster Pumps	To the Media Filters	To the Treated Water Tank	To the Injection Wells	Backwash	Recycle	Liquid Phase Separator	Cooling Tower/TCS Pond/Offsite Disposal
Maximum Flow (gpm)	900	900	900	900				
Maximum Flow (ac-ft/Year)	1,452	1,452	1,452	1,452				
Arsenic (mg/L)	0.015	0.015	0.001	0.001	0.001			
Arsenic (lbs/yr)	59.1	59.1						
pH	8.0	6.5	6.5	6.5	6.5			
Chlorine (mg/L)	0	1.15	1.15	1.15	1.15			
Calcium Hypochlorite (lb/year)		6,969						
Sulfuric Acid (mg/L)		40						
Acid (gal/year)		10,297						
Wastewater Volume (MG/yr)					0.36	0.344	0.018	0.018
Wastewater Volume (ac-ft/yr)					1.11	1.055	0.056	0.056
Nominal Flow (gpm)	450	450	450	450				
Nominal Flow (ac-ft/Year)	726	726	726	726				
Arsenic (mg/L)	0.015	0.015	0.001	0.001	0.001			
Arsenic (lbs/yr)	29.5	29.5						
pH	8.0	6.5	6.5	6.5	6.5			
Chlorine (mg/L)	0	1.15	1.15	1.15	1.15			
Calcium Hypochlorite (lb/year)		3,485						
Sulfuric Acid (mg/L)		40						
Acid (gal/year)		5,148						
Wastewater Volume (MG/yr)					0.18	0.172	0.009	0.009
Waste Volume (ac-ft/yr)					0.56	0.528	0.028	0.028

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GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CA

PROCESS

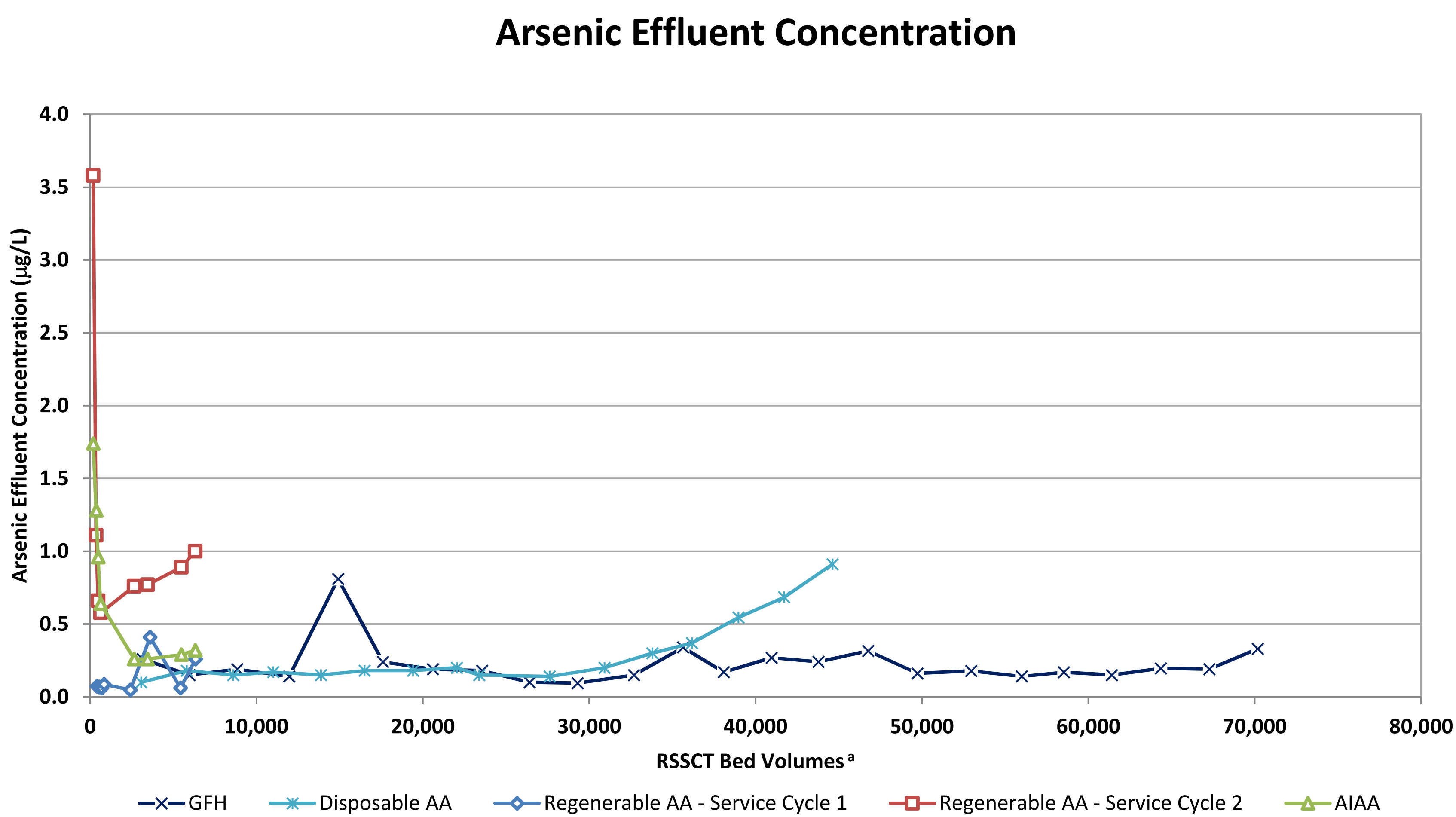
FRESHWATER PRE-INJECTION TREATMENT SYSTEM – MASS BALANCE

SHEET
DWG NO. 1
DATE 11/21/2013 02:51
REV

PRINTED NOVEMBER 21, 2013 02:50

Figures

FIGURE 1
Arsenic Effluent Concentration versus Bed Volumes



Notes:
a. One bed-volume is equivalent to the amount of adsorptive media in the column. At maximum flow, this equates to about 289 bed volumes per day.

FIGURE 2

Arsenic Effluent and Adsorption Rate

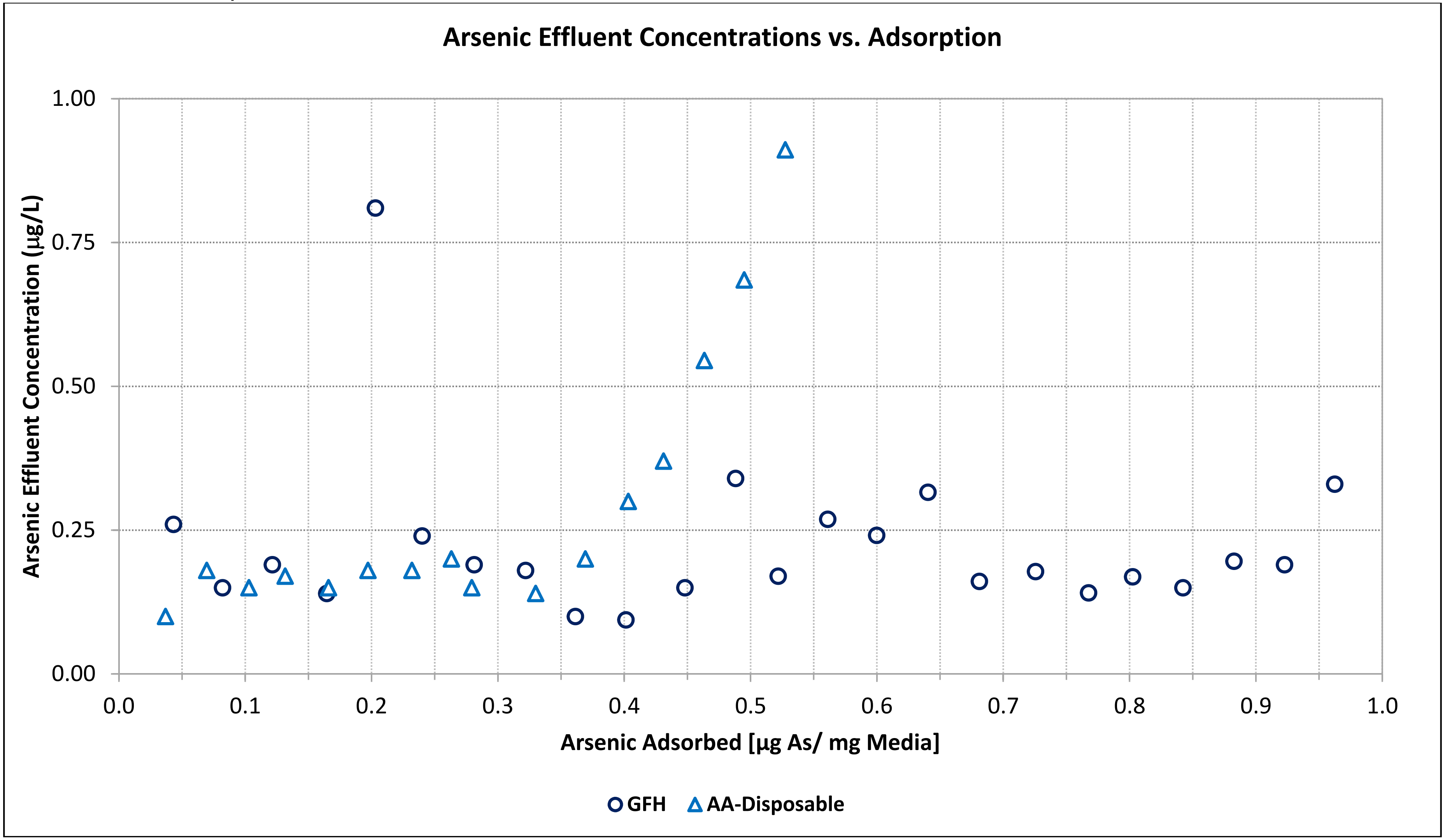


FIGURE 3
Jar Test Results

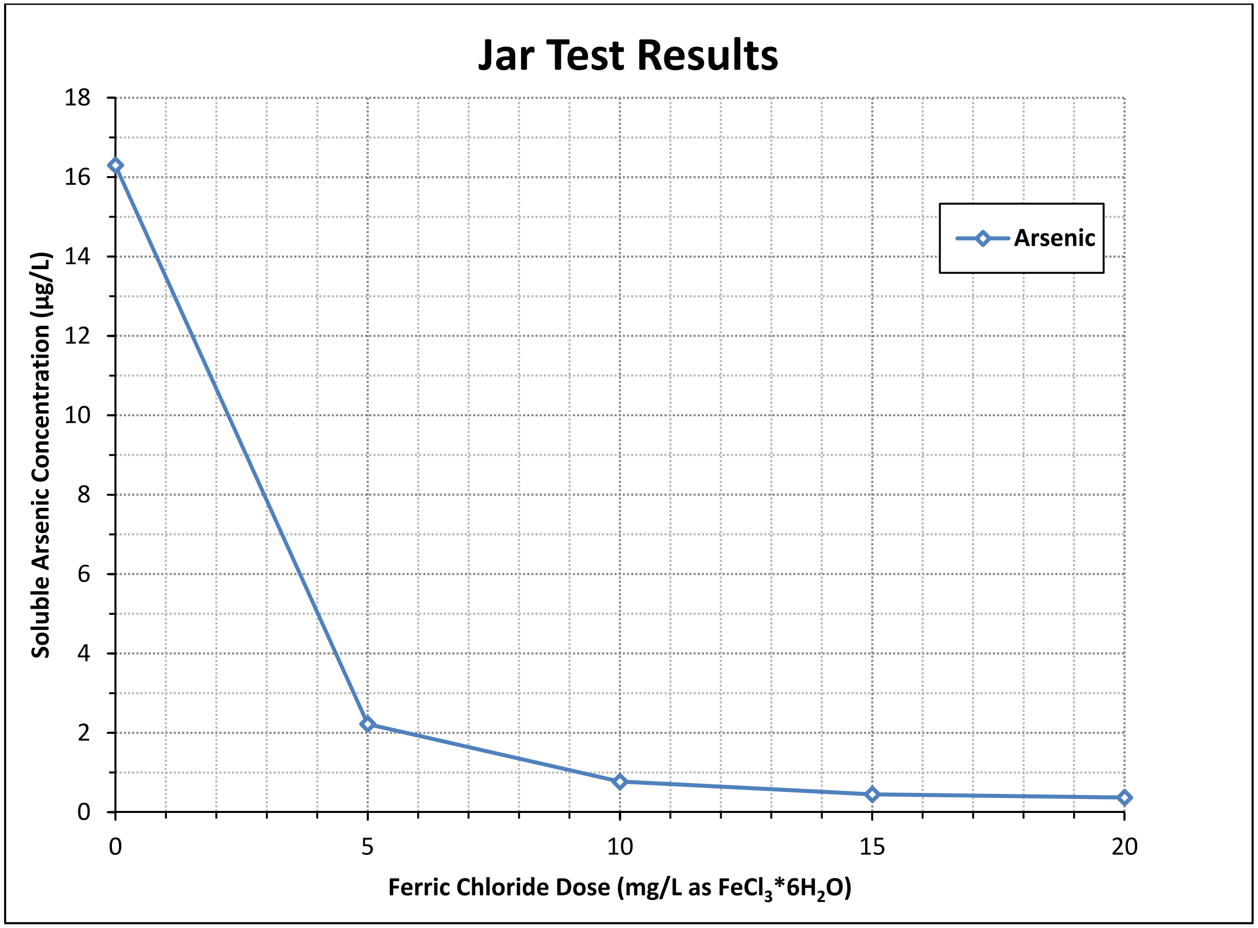
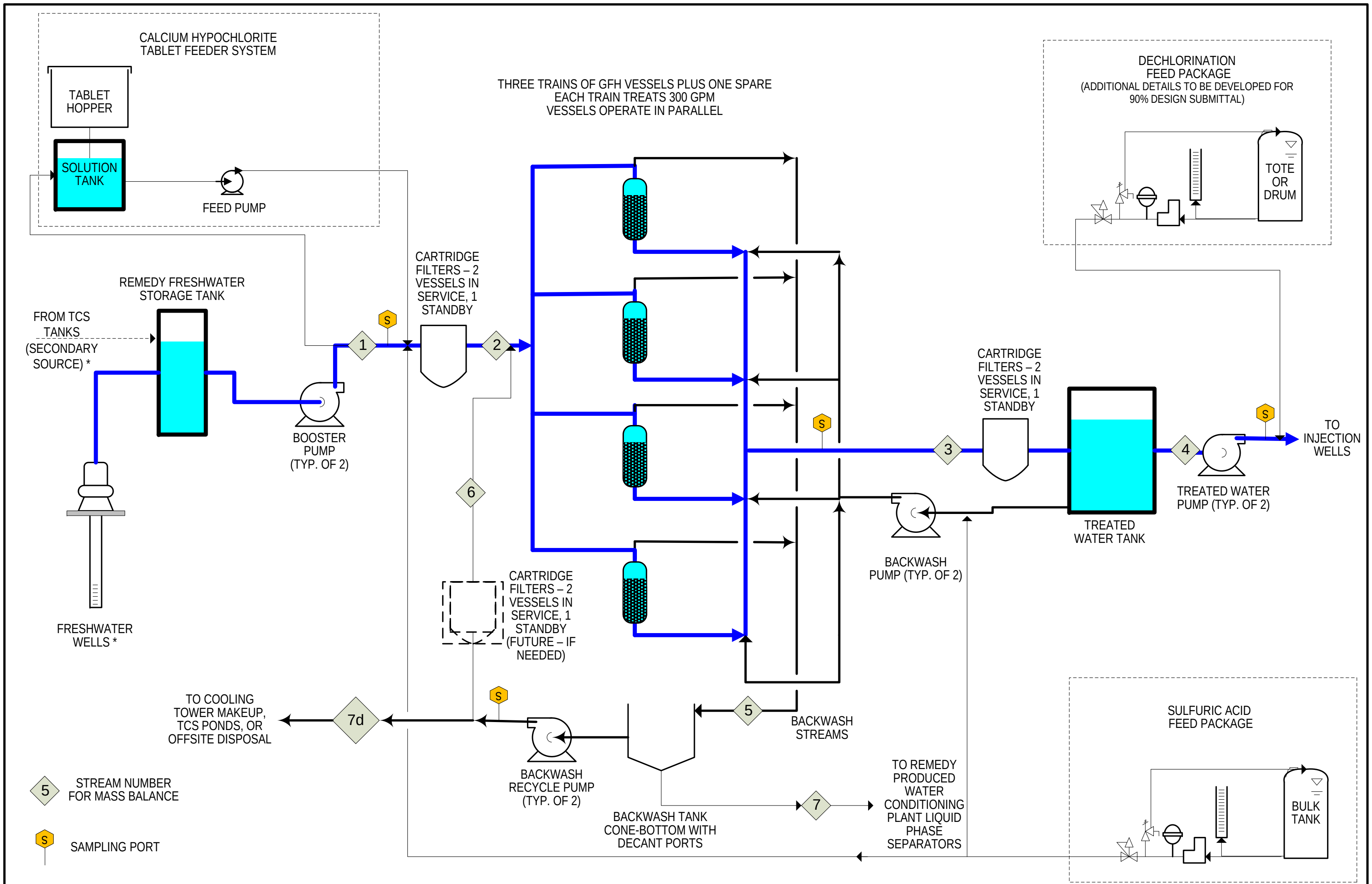


FIGURE 4
Process Flow Diagram



NOTE: * - FRESHWATER WELLS INCLUDE PRIMARY SOURCES HNWR-1 AND SITE B AND SECONDARY SOURCE TOPOCK-2/-3 WELLS THAT CURRENTLY SUPPLY THE TCS.

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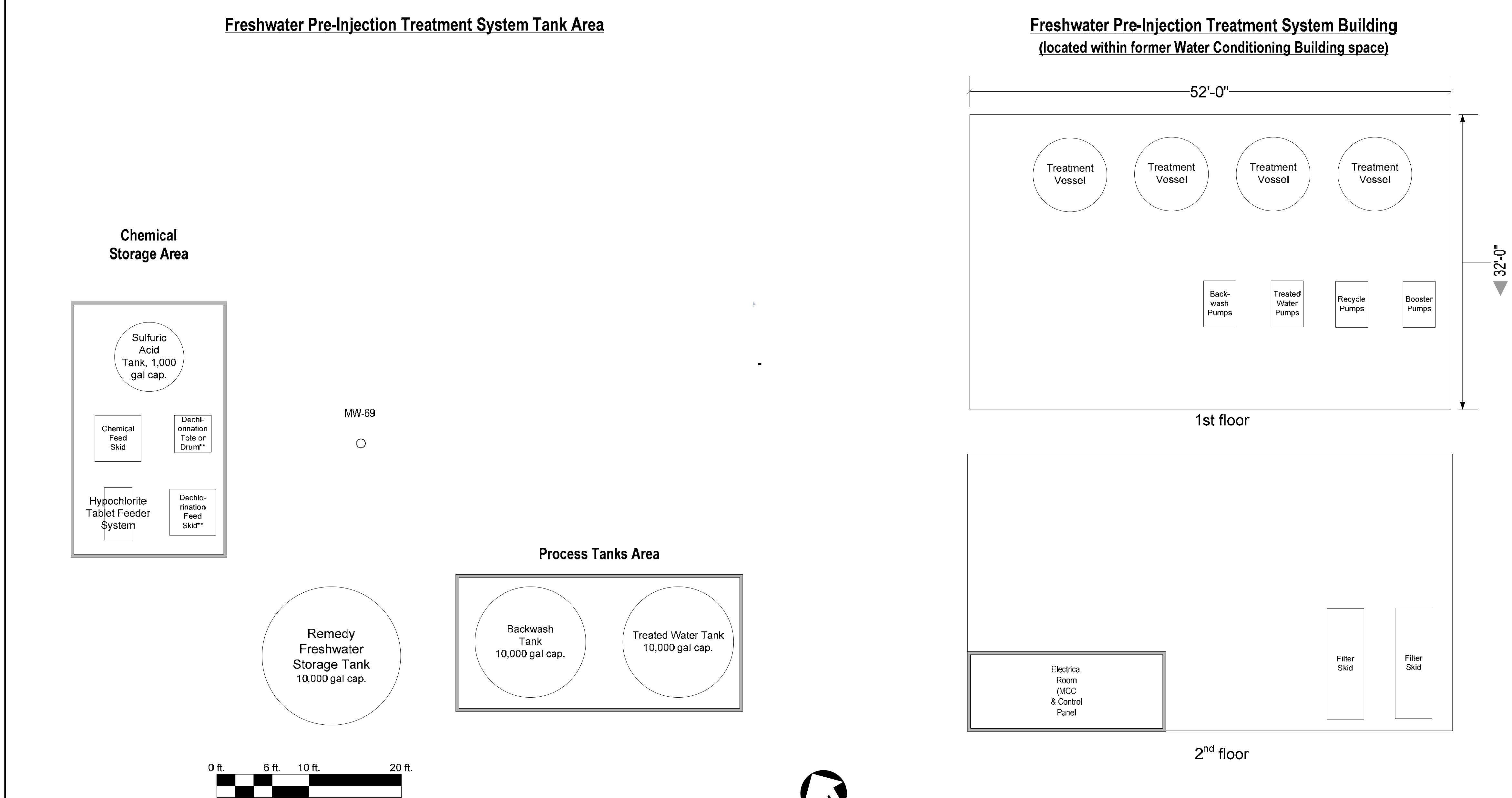
PRINTED NOVEMBER 21, 2013 02:36



Note: Scale applies within buildings and on foundations. Space between structures is approximate.
Detailed design efforts may result in changes to accommodate site constraints
** A dechlorination process is under evaluation for treated freshwater. Additional details will be developed for the 90% design submittal.

PRELIMINARY

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DSGN ODELL						REUSE OF DOCUMENTS	GROUNDWATER REMEDY PROJECT PG&E TOPOCK COMPRESSOR STATION NEEDLES, CA	GENERAL	SHEET
DR ODELL								FRESHWATER PRE-INJECTION TREATMENT SYSTEM – EQUIPMENT LAYOUT	DWG NO.
CHK MARTINEZ									DATE 12/5/2013 12:10
APVD PORCELLA	NO.	DATE	REVISION	BY	APVD				REV

NOVEMBER 25, 2013 12:05

FIGURE 5

Equipment Layout

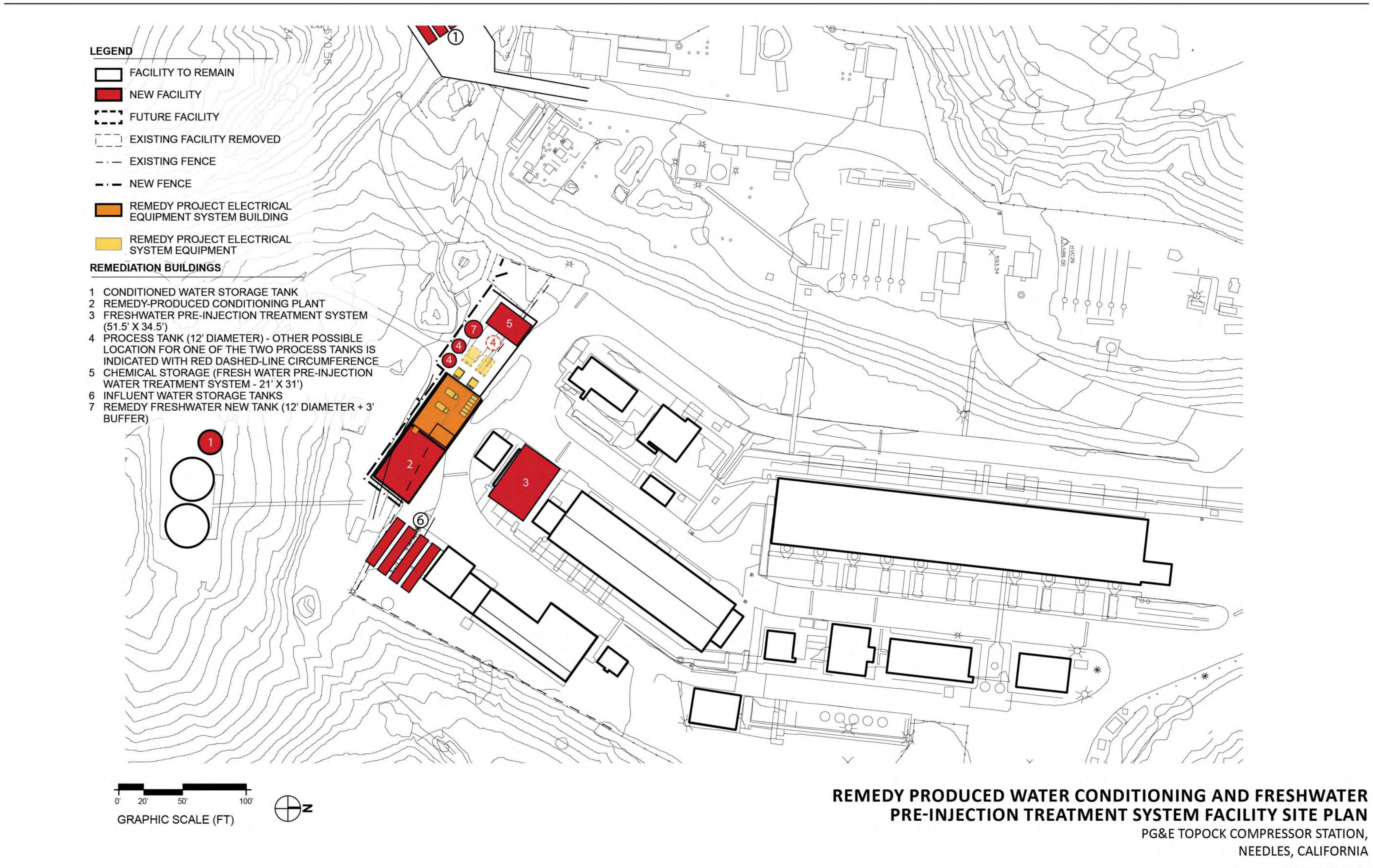

FIGURE 6
Site Layout

Appendix A
Arsenic and Fluoride Treatment Technology Screening

APPENDIX A

Arsenic and Fluoride Treatment Technology Screening

As part of the pre-conceptual design work, several treatment technologies were identified and screened to help select an effective and efficient treatment process. After technology identification, the list was screened qualitatively with a more detailed screening was completed on a short list of five technologies. Bench-scale testing was then performed to select the technology to carry forward into design.

A.1 Initial Screening

The United States Environmental Protection Agency, water and wastewater utilities, industrial concerns, research universities and centers, and industry groups have published numerous case studies and reports on testing and performance of these technologies in treating arsenic and fluoride in water (American Water Works Association, 1999; Odell, 2010). The initial list of technologies evaluated for the Topock freshwater pre-injection treatment system was developed from those technologies that have been successfully used by municipalities and industry. Unproven technologies or technologies that have not been used in full-scale applications were not considered in the screening. The initial list included anion exchange, activated alumina (AA), reverse osmosis (RO), electrodialysis reversal (EDR), lime softening, distillation, iron-based adsorbents, titanium-based adsorbents, and coagulation/filtration. The status of selection is summarized in Table A-1.

TABLE A-1
Technologies Considered for Arsenic and Fluoride Removal
Addendum to Freshwater Pre-injection Treatment System Design Basis Memorandum,
PG&E Topock Compressor Station, Needles, California

Technology	Status
Anion exchange	Screened out, significant waste generation.
AA	**Selected for bench-testing. Primary treatment option is regenerable AA if arsenic and fluoride treatment required.**
Titanium-based adsorbents	Screened out, similar as other adsorbents considered, with less experience.
RO	Screened out, significant waste generation.
EDR	Screened out, significant waste generation.
Lime Softening	Screened out, significant waste generation.
Distillation	Screened out, significant energy use and capital cost.
Coagulation Filtration	Screened out, this process does not treat fluoride. If arsenic-only treatment is required, this technology would be screened out due to more residuals are generated, additional chemicals are used, and the process is more complex than iron-based adsorbents.
Iron-based Adsorbents	Screened out, this process does not treat fluoride. **If arsenic-only treatment required, this process may be used.**

A brief process description is provided below.

Anion Exchange. Anions such as fluoride, nitrate, arsenate, selenate, and chromate can be removed from water by using ion exchange with resin. This physical-chemical process involves an easily displaceable ion on the solid phase, exchanging with an unwanted ion in the water that adsorbs to the solid phase. To accomplish the exchange reaction, a packed bed of ion-exchange resin beads is used. Source water is continually passed through the bed in a downflow or upflow mode until the adsorbent is exhausted, as evidenced by the appearance (breakthrough) of the unwanted contaminant at an unacceptable concentration in the effluent.

The most useful ion-exchange reactions are reversible. In the simplest cases, the exhausted bed is regenerated using an excess of the displaceable ion in the form of salt brine. Ideally, no permanent media structural change occurs during the exhaustion/regeneration cycle. This is a proven technology, is widely used, and is easy to automate, but it generates considerable wastewater.

Activated Alumina*.* AA is a semi-crystalline porous inorganic adsorbent, is a proven technology for fluoride removal, and effectively removes arsenic. The removal mechanism, which is one of exchange of contaminant anions for surface hydroxides on the alumina, is generally called adsorption, although ligand exchange is a more appropriate term for the highly specific surface reactions involved. Packed beds of AA are used in water treatment plants in a similar manner to anion exchange. Regeneration is accomplished using a basic solution like sodium hydroxide (caustic). The adsorbent media can be purchased in a disposable form as well. In this case, the spent media is disposed in an offsite facility. This is a proven technology, is widely used, is easy to automate, but it generates considerable wastewater.

Titanium-based adsorbents*.* These are porous adsorbents made with titanium that work similarly to AA in that surface hydroxides exchange with fluoride in the water stream. Similarly, caustic is used to regenerate the adsorbent in the packed beds. This is a newer process with fewer systems in service.

Reverse Osmosis. RO is a membrane water treatment system in which water is pressurized to more than 100 pounds per square inch and is directed through small pores in a synthetic membrane. Treated water is produced through the other side of the small pores while larger particulates are retained on the inlet side of the membrane. RO is effective in removing uranium, radium, arsenic, fluoride, nitrates, microbial contaminants, and many chemicals. Because of the high pressure required for the process, RO systems typically are energy-intensive and have high initial costs. Furthermore, these systems can require more operator attention and can require membrane integrity testing. RO systems also risk fouling and scaling from hard water, colloids, and bacteria. The fouling and scaling increase the pressure drop and result in a shorter lifetime for the membrane or frequent chemical cleaning. In addition, this process generates considerable volumes of wastewater.

Electrodialysis Reversal. EDR is a membrane water treatment process that relies on polarizing electrodes to remove contaminants. The ions in the water are attracted to the membrane by a cathode or anode. Once attracted to the membrane, the ion is transported electrically through the membrane. EDR systems reverse the polarity of the electrodes every 15 to 20 minutes. This process releases accumulated ions and has the following advantages:

- Breaks up scale and reduces the potential for scaling.
- Reduces microbiological growth on the membrane.
- Reduces membrane cleaning frequency.

EDR systems operate at higher pressures than most water treatment systems but not as high as RO systems. They are maintenance intensive and generate considerable volumes of wastewater.

Lime Softening. Hardness in water is characterized by elevated levels of magnesium and calcium. Lime softening removes the hardness by mixing lime (slaked or hydrated) during the treatment process. The lime addition increases the pH of the water and causes the magnesium and calcium to precipitate out. Flocculation and sedimentation units are employed to provide a sufficient time and space to accumulate solids. Magnesium requires a higher pH than calcium to cause precipitation and results in water with a pH as high as 11. Carbon dioxide is used commonly to reduce the pH back to desired levels. This process, although used often, requires careful chemical dosing and process monitoring, requires large amounts of chemicals, and generates large amounts of waste sludge.

Distillation. To distill water, water is heated until boiling and vaporized. The resulting steam is collected and condensed in a clean storage tank. Distillation is effective in removing metals, hardness, and particulates because they do not vaporize with the water. The boiling process also kills bacteria and some viruses. Distillation is ineffective in removing contaminants with a lower boiling point than water, such as benzene. These contaminants must be removed before condensation or recontamination will occur. This process is straightforward to operate but uses high amounts of energy and requires costly metal alloys for construction.

Coagulation Filtration. Coagulation is a process in which smaller particles in suspension attach to one another through electrostatic forces. As the particles attach to one another, larger particles start to form. Aluminum and ferric salts are the most commonly used compounds to enhance coagulation because aluminum or iron hydroxide is formed. Once finished with the coagulation process, the water is filtered through a media filter or microfilter to remove the aggregated particles. Coagulation filtration has been found very effective in removing arsenic from water. While often some form of pretreatment is needed (usually chlorine oxidation), coagulation filtration systems can achieve over a 90 percent reduction in arsenic. However, this process does not treat fluoride. The process is relatively easy to operate.

Iron-based Adsorbents. Contaminated water is passed through a pressure vessel that contains iron based adsorbents that remove arsenic. Granular ferric hydroxide is a common example that is in an amorphous crystalline form. Iron-based adsorbents have been shown effective in removing arsenic (not fluoride) at pH levels normally found in drinking water; however, best performance happens at lower pH levels. Lower pH levels may result in the need for more operator attention and the possibility of handling hazardous chemicals. Once the media has been lost its adsorbent capacity, the spent media is replaced.

A.1.1 Initial Screening Results

As a result of the screening, five technologies were retained for further evaluation:

- Anion exchange
- AA adsorption – disposal media and regenerable media
- Iron-based adsorbents
- Coagulation/filtration

The following technologies were rejected based on the reasons listed below.

- **EDR and RO:** processes generate large residual wastewater streams that must be disposed of.
- **Lime softening:** generates large volume of waste sludge that is difficult and costly to dispose of.
- **Titanium-based adsorbents:** effective at very low pH or with expensive rare earth metals and has the fewest number of operating systems.
- **Distillation:** high cost for energy use.

A.2 Second-level Screening

The two remaining technologies were screened at a second level with AA divided into regenerable and disposable forms. The screening criteria were as follows:

1. Treatment Effectiveness
   - Ability to achieve treatment goals
2. Reliability and Flexibility
   - Ability to allow variation in influent water
   - Expandability

3. Operational Complexity
   - Ease of operation
   - Safety
4. Waste Generation
   - Quantity and quality
5. Footprint
6. Cost Effectiveness

As a result of the screening, anion exchange was not carried forward and was dropped from further consideration because of its lower effectiveness, greater operational complexity, the wastewater volumes generated, and its higher operating cost. The four processes— regenerable AA and disposable AA, iron-based adsorbents, and coagulation/filtration —were advanced to bench-scale testing.

A.3 Bench-scale Testing

As described in the body of the Design Basis Technical Memorandum, bench-scale testing was performed after the technology screening. Testing showed that regenerable AA and iron-based adsorbent were the technologies that best met design needs if both arsenic and fluoride removal, or arsenic removal alone is required Disposable AA was eliminated from further evaluation.

A.4 References

American Water Works Association. 1999. *Water Quality and Treatment - A Handbook of Community Water Supplies*, 5th Edition. Ed. by R.D. Letterman.

Odell, Lee H. 2010. *Treatment Technologies for Groundwater*. American Water Works Association.

Attachment G: RTC #260, #263, #288-291, #320, #321, #776a

Soil Storage/Construction Staging Areas - Decision Matrices/Figure 7.6-1

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VIA ELECTRONIC MAIL

March 6, 2014

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Topock Project Manager
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, California 90630

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: Fort Mojave Indian Tribe Comments on Alternative Pipeline Routings and Proposed Soil Storage/Staging Areas for the Topock Compressor Station 60% Groundwater Remedy Design

Dear Mr. Yue and Ms. Innis:

Hargis + Associates, Inc. ("H+A"), on behalf of and at the request of its client, the Fort Mojave Indian Tribe ("the Tribe" or "FMIT"), is hereby providing this letter regarding the Tribe's review of alternative pipeline routings for the Topock Compressor Station 60% groundwater remedy design (Enclosure A).

As you are aware, these alternative routings have been the subject of discussion at recent meetings of the Technical Working Group ("TWG") and, most recently, the FMIT along with representatives of the Hualapai, Colorado River Indian Tribes, and Cocopah, performed a site walk on February 21, 2014, during which tribal representatives and their technical consultants conferred on the acceptability of these various alternatives. The FMIT was represented by nine Tribal members including a member of Tribal Council. Afterwards, the FMIT members conferred and completed the enclosed matrix providing the Tribe's position on each of the various segments along the pipeline route (Enclosure A). This information is being provided as the Tribe's final comments on the 60% design, with the understanding that you will be directing the Pacific Gas & Electric Company ("PG&E") to take this information into consideration during the preparation of the 90% Basis of Design. The matrix also assumes that any construction or deconstruction would be done in the least impactful manner and in consultation with the Tribe.

Additionally, the Tribe is also presenting herein its position on the various staging and soils storage areas proposed by PG&E (Enclosures B & C). Please find an attached matrix addressing those preferences. Please note that on the matrix, there are several sites for which the Tribe has outstanding questions. Therefore, before the Tribe can determine the final acceptability of these sites, answers to these questions need to be provided to the Tribes.

Finally, the Tribe wishes to add that the comments and preferences as expressed herein do not in any way constitute an endorsement or acceptance of the design as originally presented or as potentially modified by these alternatives. For as you have repeatedly been made aware, many of the adverse impacts associated with this project are permanent and irreversible.

Thank you in advance for consideration of these comments. Please contact me if you have further questions.

Sincerely,

HARGIS + ASSOCIATES, INC.

Leo S. Leonhart

Leo S. Leonhart, PhD, PG, CHG
Principal Hydrogeologist

LSL/keh

Enclosures: A -FMIT Pipeline Segment Analysis
B - Soils Staging / Construction Areas FMIT Comment Table
C – Staging Areas Map

cc w/encl: C. Coyle
C. Garcia, FMIT
K. Liebhauser, BLM
N. McDowell, FMIT
L. Otero, FMIT
T. Williams, FMIT
Tribal Representatives for Hualapai, CRIT, Chemehuevi, Cocopah

ENCLOSURE A

FMIT PIPELINE SEGMENT ANALYSIS

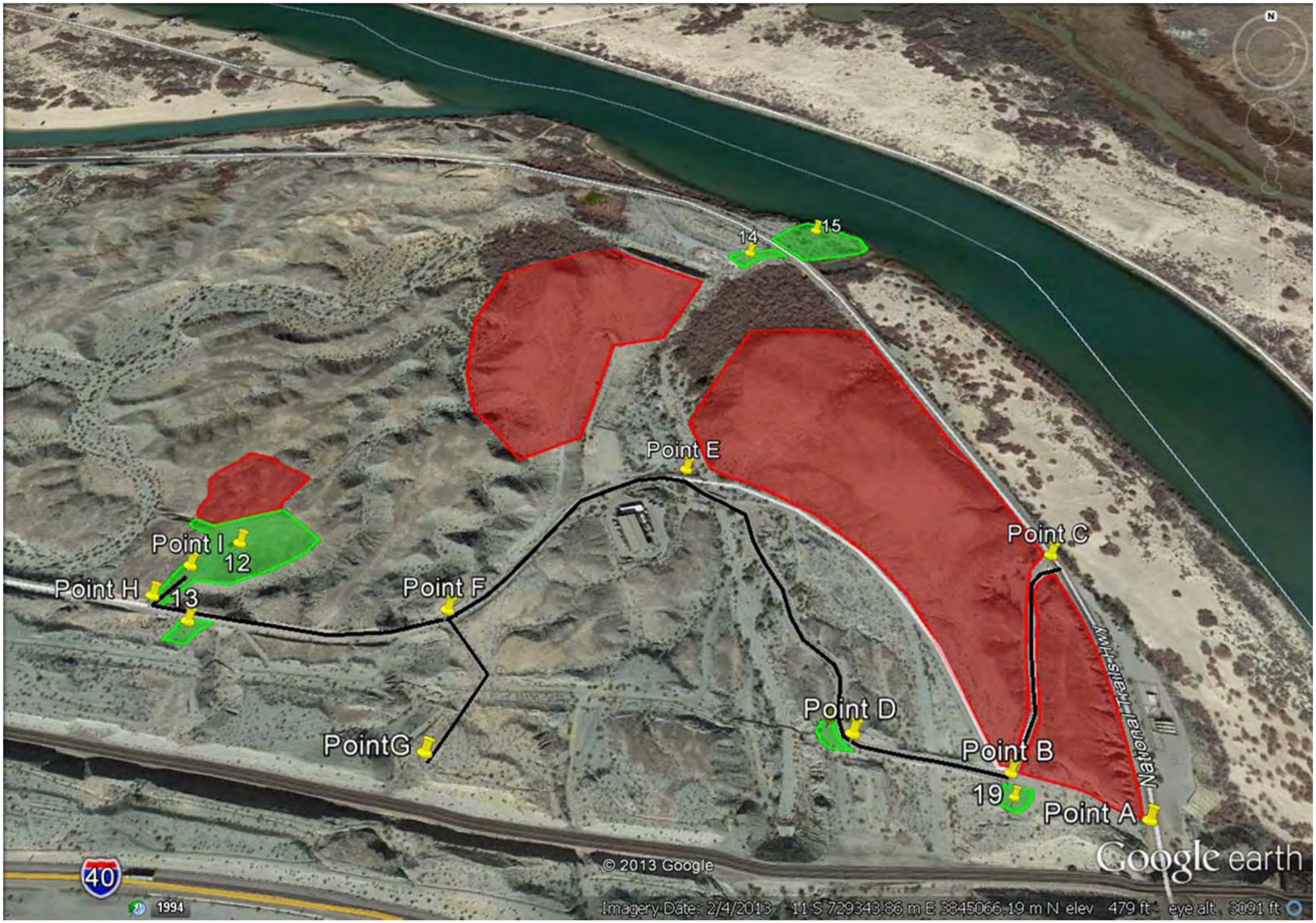
PIPELINE SEGMENT ANALYSIS

PIPELINE POINTS (Segment Description)	**ABOVE/BELOW GROUND**	**CONDITIONS OF USE COMMENTS**
A TO B (NTH near MW20 Bench, access upslope to top of slope, adjacent to the SoCal pipeline easement)	NEITHER	After much review and consideration, there does not seem to be either an above- or below-ground alternative for this segment that appears acceptable. Assuming it will not be possible to intrude into the easement, instead, use the "C to B" segment for piping alignment
C TO B (Entrance along NTH, along road south of Locus B; to top of slope, across from MW20 bench)	Below	Although above-ground is generally preferred, the narrowness of the roadway along this segment makes it unlikely the piping could be placed above ground with sufficient road access without making significant cuts and disturbance into the in-place geologic materials alongside this road segment. Note this segment of road runs through a large cultural area on either side, therefore no additional disturbance, outside of the present-day existing roadway, should be made. 1) No additional cuts would be made into the banks on either side of the roadway. 2) Existing slopes would not be disturbed. 3) No activity, storage or personnel activity should extend beyond the current roadway. This includes the slopes adjacent to the existing road. All below ground piping will be removed after remedy completion.
B TO D (Section of dirt access road from top of slope west to Bat Cave Wash)	Above	Given the wide road access along this segment, above-ground piping could be installed. 1) Construction activity, storage and personnel activity should be limited to the roadway to the extent possible to minimize encroachment into the areas adjacent to the existing road.
D TO E (Continuing along access road, along the east side of Bat Cave Wash to where road crosses wash near IM-3)	Above	1) Construction activity, storage and personnel activity should be limited to the roadway to the extent possible to minimize encroachment into the areas adjacent to the existing road.
E TO F (From Bat Cave Wash crossing, along Route 66 westward past IM-3 to IRL-3)	Above	Above-ground installation is preferred. 1) No additional cuts would be made into the banks on either side of the roadway. 2) Existing slopes would not be disturbed.

PIPELINE SEGMENT ANALYSIS

PIPELINE POINTS (Segment Description)	ABOVE/BELOW GROUND	CONDITIONS OF USE COMMENTS
F TO G (From IRL-3 along single land dirt access road, down into wash and location of IRL-4.)	Below	This short section from IRL-3 to IRL-4 in the wash is along a narrow, one-lane access road. The narrow width of the existing one-lane access road, and existing embankment where road would be built to provide access down to IRL-4 does not appear to allow for both vehicle access and above-ground piping and supports. While above-ground installation is preferred where possible, placing the injection well piping below-ground along this segment should constrain disturbance to the foot print of the existing roadway 1) Activity and construction in this area to remain strictly constrained to the existing dirt road. 2) Construction of the roadway down into the wash for IRL-4 should consist of fill placement, rather than any additional cut, to the extent possible. 3) All below ground piping will be removed after remedy completion.
F TO H TO I (From IRL-3, west along Route 66 to FW-1)	Above	Above ground installation is preferred. 1) No additional cuts would be made into the banks on either side of the roadway. 2) Existing slopes would not be disturbed.

PIPELINE SEGMENT ANALYSIS



HARGIS + ASSOCIATES, INC.

ENCLOSURE B

SOILS STAGING / CONSTRUCTION AREAS
FMIT COMMENT TABLE

Soils Staging / Construction Areas FMIT Comment Table

STORAGE/STAGING AREA		ACERAGE	LOCATIONS / NOTES	COMMENTS
1-5	**Soils storage**	11.1	All in Park Moabi Area	*Tribes said yes (CHPMP 1/14)*
6	**Soils storage**	0.67	Across from IM-3	*Tribes said no (CHPMP 1/14)*
7	**Soils storage**	0.28	East of #6	*Tribes said no* (CHPMP 1/14)
8	**Soils storage**	0.17	Southeast of #7	*Tribes said no* (CHPMP 1/14)
9	**Construction Staging**			*Tribes said yes (CHPMP 1/14)*
10	**Construction Staging**	0.51		*Tribes said yes (CHPMP 1/14)*
11	**Construction Staging**	5.69		*Tribes said no (CHPMP 1/14)*
12	**Construction Staging**	1.53		*Tribes said no (CHPMP 1/14)*
13	**Soils storage**	0.15		*Tribes said no (CHPMP 1/14)*
14	**This site is proposed for construction materials**	0.28	This is CA-SBR-11862H. BLM is the agency to make determinations of eligibility, not PGE as in PGE's report [1](pp22-25). On the map in the report, (see footnote 1) page 25, maze remnants are visible slightly southwest of the boundary of CA-SBR-11862H.	Tribes have questions: 1. Is it temporary? 2. Fencing? With what? 3. SHPO Clearance? 4. What activities? 5. Lighting? 6. Extent of the staging area? From where to where? 7. What has BLM determined regarding eligibility and potential impacts to this area?
15	**This site is proposed for construction materials**	1.11	*On the map, this site is across Old National Trails Highway along the river. There is creosote here. Animals go down into the outlet area for water. Has a rock-lined walkway down. There is a small beach area (when low water). This is the end of Bat Cave Wash.*	Tribes have questions: 1. Vegetation removal? Tribes do not want vegetation removed. 2. Wider access = modifications? Tribes do not want that. 3. Watchmen, guards, restrooms? 4. What activities? 5. Lighting? Generators? 6. When was this area last surveyed for cultural materials? 7. Extent of the staging area? From where to where?
16		0.06		*Tribes said no*

[1] National Register of Historic Places Eligibility Evaluation of CA-SBR-11862H, San Bernardino California, David D. Earle and Barry A. Price. Prepared by Applied Earthworks and Earle and Associates, submitted to Pacific Gas and Electric Co. September 2013.

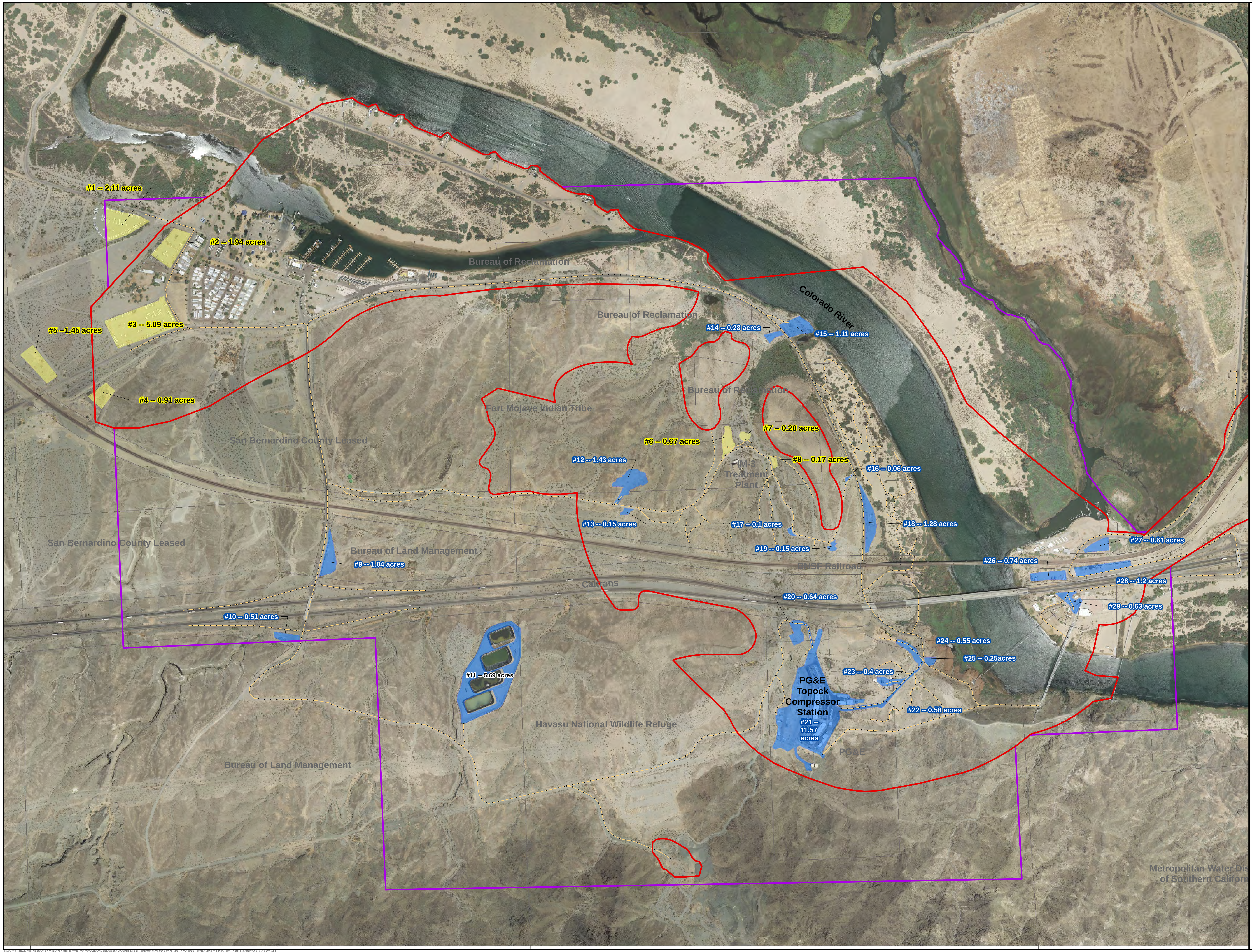
Soils Staging / Construction Areas FMIT Comment Table

17	This site is proposed for construction materials	0.1		*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?
18		1.28		*Tribes said yes (CHPMP 1/14)*
19	This site is proposed for construction materials	0.15	Located across from the southern tip of CA-SBR-219 Locus B (Maze). There is a better place to the west (down the slope) where there already exists a large level place with a well (MW25) Why not go there instead? Proposed IRL7 near- by. Also N (?).	*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?
20	This site is proposed for construction materials	0.1		*Tribes still need to visit this site*
21	**Construction Staging**	11.57	Compressor Station	*Tribes said yes (CHPMP 1/14)*
22	**Construction Staging**	0.58		*Tribes said yes (CHPMP 1/14)*
23	**Construction Staging**	0.4		*Tribes said yes (CHPMP 1/14)*
24	**Construction Staging**	0.55		*Tribes said yes (CHPMP 1/14)*
25	**Construction Staging**	0.25		*Tribes said no (CHPMP 1/14)*
26	**Construction Staging**	0.74		*Tribes said yes (CHPMP 1/14)*
27	**Construction Staging**	0.61		*Tribes said yes (CHPMP 1/14)*
28	**Construction Staging**	1.2		*Tribes said yes (CHPMP 1/14)*
29	**Construction Staging**	0.63		*Tribes said yes (CHPMP 1/14)*

HARGIS + ASSOCIATES, INC.

ENCLOSURE C

STAGING AREA MAP



LEGEND

- EIR Project Area
- Area of Potential Effects (APE)
- Proposed Access Routes
- Potential Soil Storage Area/ Proposed Staging Area
- Proposed Staging Areas

Notes:

1. PG&E may use all or a subset of these potential temporary staging areas during remedy construction.
2. Note that in compliance with EIR mitigation measure CUL-1a-9 as well as PA and CHPMP mitigation measures, the proposed access route west of National Trails Highway is located in an existing, previously disturbed, access road. The location of the access road was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10 and PA and CHPMP mitigation measures

N

0 300 600 1,200 Feet

Updated per September 17-18 TWG Discussion

FIGURE 7.6-1
PROPOSED STAGING AREAS, CONSTRUCTION YARD, AND ACCESS ROUTES

GROUNDWATER REMEDY BASIS OF DESIGN REPORT
INTERMEDIATE (60%) DESIGN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Hualapai Department of Cultural Resources
P.O. Box 310
Peach Springs, Arizona 86434
Office: 928.769.2223 FAX: 928.769.2235

March 10, 2014 **HDCR File: 2014-663**

VIA ELECTRONIC MAIL
Mr. Aaron Yue
Topock Project Manager
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, California 90630

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: 60% Pipeline Alternatives and Soils / Staging Matrices

Dear Mr. Yue:
On behalf of the Hualapai Tribe, we appreciate being able to discuss pipeline alternatives as presented in various meetings and consultative group walks regarding the 60% Basis of Design for the Topock Remediation Project. As you are aware, the Hualapai along with other Tribal representatives met at Topock on February 21st, 2014 to visit and discuss alternative pipeline routings for the 60% groundwater remedy. Hualapai tribal representatives and two Hualapai Tribal Council members were present during this meeting. After the meeting it was agreed that a pipeline matrix and soils staging area table would be sent to interested tribes that included tribal comments wile in the field.

In this letter we formally present Hualapai's comments regarding pipeline alternatives and soils / staging areas considered by Pacific Gas & Electric for the 90% Basis of Design. Even though we are aware that the groundwater remedy infrastructure is creating permanent and irreversible cumulative negative impacts, both spiritually and to the cultural landscape at Topock, we are confident that PG&E will do everything in their power to remove all infrastructure components (whether or not pipelines are placed above or below ground) five years after all remediation activity ceases.

Figure 1 below, shows pipeline alternatives with Table 1 documenting comments from Hualapai. Regarding Table 2, below, this table has tribal responses that were solicited on January 14, 2014. It also has comments and questions regarding several areas visited on February 21st. Perhaps we can discuss these at the March 14th CHPMP meeting with BLM. There is one outstanding soils location (#20) that still requires visitation. Perhaps we can do this on March 14th, 2014 (CHPMP meeting with BLM, in the morning followed by visit to Topock), when we will be out at Topock.

We appreciate our on-going consultations and collaborations with the Topock Remediation Project and look forward to meaningful dialogue through-out the up-coming years. If you have any concerns please feel free to contact myself, or Dawn Hubbs, Program Manager and we will be happy to assist you.

Sincerely,

Loretta Jackson-Kelly

Loretta Jackson-Kelly, Director and Tribal Historic Preservation Officer
Hualapai Department of Cultural Resources

Cc:
Mr. Rudy Clark, Sr., Councilman, Hualapai Tribal Council
Mr. Robert Bravo, Councilman, Hualapai Tribal Council
Karen Baker, CHG, CEG, Chief, Geological Services Branch
Tribal Reps

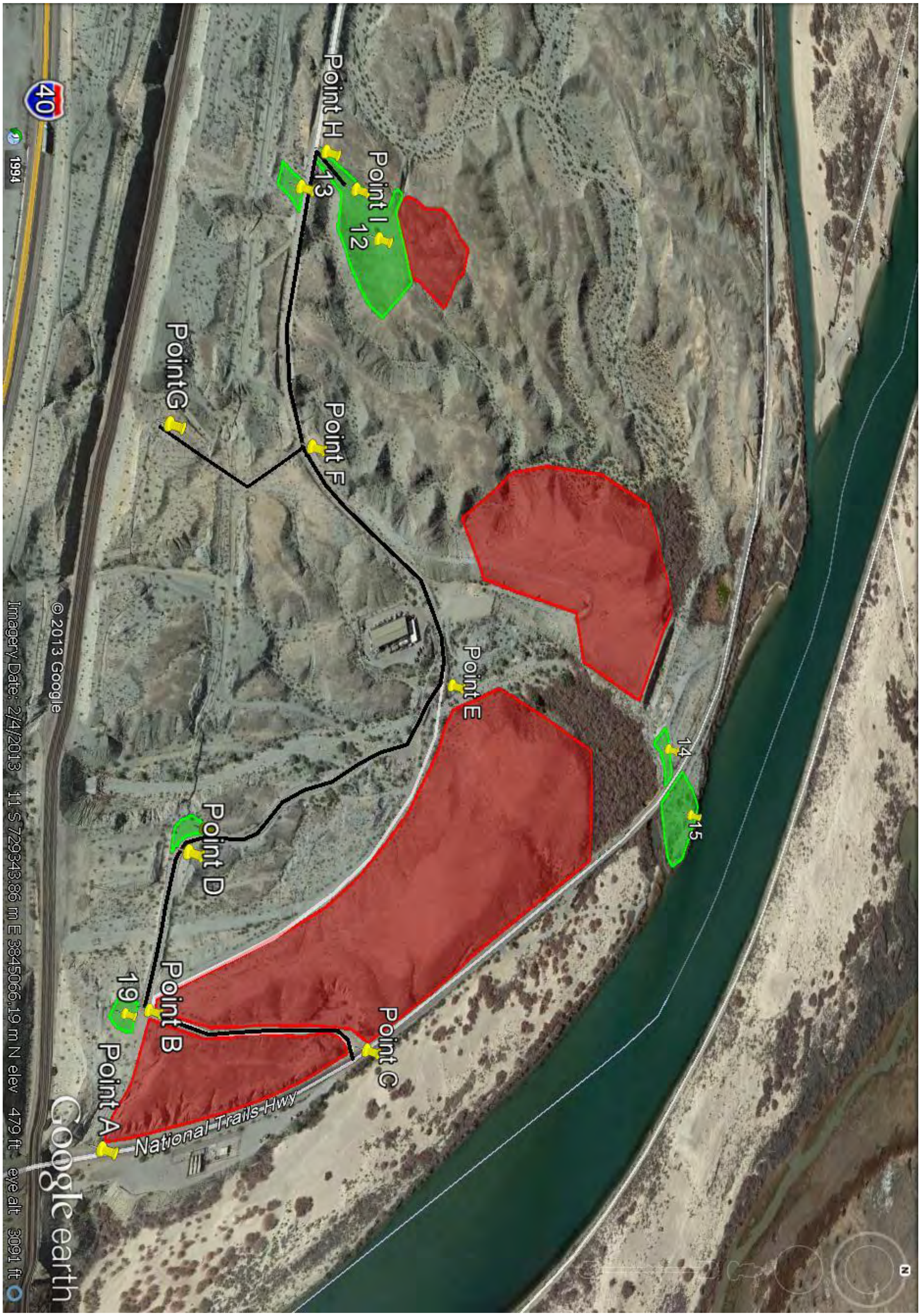


Figure 1: Red Areas = Cultural Sites - Green Areas = Soils Staging Areas - Black Line = Pipeline

Table 1: Hualapai Department of Cultural Resources Pipeline Points and Comments

PIPELINE POINTS	ABOVE/BELOW GROUND	CONDITIONS OF USE COMMENTS
A TO B	**Neither.** Hualapai do not want to see this alternative used at all.	Hualapai do not want this segment of the pipeline to be used. There is significant damage to this area (which is not being refurbished or maintained for erosion and run-off) and this segment would cause more damage. It would also impact a multi-component archaeological site. Avoidance is recommended.
B TO C	**Below Ground**	The segment is in an existing road. Please go in the center of the road, no additional widening or slope cutting due to cultural materials on the upper slopes. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.
B TO D	**Above Ground or Below Ground**	The segment is in an existing road. Please go in the center of the road, no additional widening or slope cutting. Soils location 19 is near this segment. We would prefer that this segment not utilize location 19 as there is a point west and down the road that would be preferable for staging. See Table 2. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.
D TO E	**Above Ground or Below Ground**	The segment is in an existing road. Please go in the center of the road, no additional widening or slope cutting. Cultural materials are in this vicinity. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance

		levels of Chrome VI.
E TO F	**Above Ground or Below Ground**	The segment is in an existing road. Please go in the center of the road, no additional widening or slope cutting. Prefer minimal bridge construction considerations. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.
F TO G	**Below Ground**	This is a very small area without a lot of room. There is an archaeological site (CA-SBR-11939) in this area and there is a plan to put IRL3 in this vicinity also. There is going to be a great deal of activity in this small area, so we request cultural clearances with tribal monitors in attendance, prior and during this segment's construction phase. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.
F TO H TO I	**Above Ground**	This area is very close to cultural materials. Prefer that there be no additional widening of the existing road. We request cultural clearances with tribal monitors in attendance, prior and during this segment's construction phase. There is a plan to put FW1 near this location also. All infrastructure materials to be removed five years after achieving acceptable ground water tolerance levels of Chrome VI.

Table 2: Soils Staging / Construction Areas Hualapai Comment Table

STORAGE/STAGING AREA	ACERAGE	LOCATIONS / NOTES	COMMENTS
1-5 Soils storage	11.1	All in Park Moabi Area	*Tribes said yes (CHPMP 1/14)*
6 Soils storage	0.67	Across from IM-3	*Tribes said no (CHPMP 1/14)*
7 Soils storage	0.28	East of #6	*Tribes said no* (CHPMP 1/14)
8 Soils storage	0.17	Southeast of #7	*Tribes said no* (CHPMP 1/14)
9 Construction Staging			*Tribes said yes (CHPMP 1/14)*
10 Construction Staging	0.51		*Tribes said yes (CHPMP 1/14)*
11 Construction Staging	5.69		*Tribes said no (CHPMP 1/14)*
12 Construction Staging	1.53		*Tribes said no (CHPMP 1/14)*
13 Soils storage	0.15		*Tribes said no (CHPMP 1/14)*
14 ***This site is proposed for construction materials***	0.28	This is CA-SBR-11862H. BLM is the agency to make determinations of eligibility, not PGE as in PGE's report [1](pp22-25). On the map in the report, (see footnote 1) page 25, maze remnants are visible slightly southwest of the boundary of CA-SBR-11862H.[2]	Tribes have questions: 1. Is it temporary? 2. Fencing? With what? 3. SHPO Clearance? 4. What activities? 5. Lighting? 6. Extent of the staging area? From where to where? 7. What has BLM determined regarding eligibility and potential impacts to this area?
15 ***This site is proposed for construction materials***	1.11	*On the map, this site is across Old National Trails Highway along the river. There is creosote here. Animals go down into the outlet area for water. Has a rock-lined walkway down. There is a small beach area (when low water). This is the end of Bat Cave Wash.*	Tribes have questions: 1. Vegetation removal? Tribes do not want vegetation removed. 2. Wider access = modifications? Tribes do not want that. 3. Watchmen, guards, restrooms? 4. What activities? 5. Lighting? Generators? 6. When was this area last surveyed for cultural materials? 7. Extent of the staging area? From where to where?
16	0.06		*Tribes said no*
17 ***This site is proposed for construction materials***	0.1		*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?
18	1.28		*Tribes said yes (CHPMP 1/14)*
19 ***This site is proposed for construction materials***	0.15	Located across from the southern tip of CA-SBR-219 Locus B (Maze). There is a better place to the west (down the slope) where there already exists a large level place with a well	*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?

[1] National Register of Historic Places Eligibility Evaluation of CA-SBR-11862H, San Bernardino California, David D. Earle and Barry A. Price. Prepared by Applied Earthworks and Earle and Associates, submitted to Pacific Gas and Electric Co. September 2013.

[2] Please note that management recommended that this site be avoided. Therefore this location is not suitable for staging. Please refer to *Topock Remediation Project Additional Soils Investigation, Condition Assessments at Fourteen Archaeological and Historical Sites,* Hearth, et. Al. Prepared by Applied Earthworks Inc., submitted to PG&E November 2013, reference site recordCA-SBR-11862H #8, page 1 of 5.

		(MW25) Why not go there instead? Proposed IRL7 near- by. Also N (?).	

STORAGE/STAGING AREA	ACERAGE	LOCATIONS / NOTES	CONDITIONS OF USE COMMENTS
20 ***This site is proposed for construction materials***	0.1		*Tribes still need to visit this site*
21 Construction Staging	11.57	Compressor Station	*Tribes said yes (CHPMP 1/14)*
22 Construction Staging	0.58		*Tribes said yes (CHPMP 1/14)*
23 Construction Staging	0.4		*Tribes said yes (CHPMP 1/14)*
24 Construction Staging	0.55		*Tribes said yes (CHPMP 1/14)*
25 Construction Staging	0.25		*Tribes said no (CHPMP 1/14)*
26 Construction Staging	0.74		*Tribes said yes (CHPMP 1/14)*
27 Construction Staging	0.61		*Tribes said yes (CHPMP 1/14)*
28 Construction Staging	1.2		*Tribes said yes (CHPMP 1/14)*
29 Construction Staging	0.63		*Tribes said yes (CHPMP 1/14)*

Table 2: Soils Staging / Construction Areas Hualapai Comment Table (Continued from page 3)

THE COCOPAH INDIAN TRIBE
Cultural Resource Department
14515 S. Veterans Drive
Somerton, Arizona 85350
Telephone (928) 627-4849
Fax (928) 627-3173

Project Number: CCR-032-06-001

VIA ELECTRONIC MAIL March 13, 2014

Mr. Aaron Yue
Topock Project Manager
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, California 90630

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: 60% Pipeline Alternatives and Soils / Staging Areas

Dear Mr. Yue/Ms. Innis:

The Cocopah Indian Tribe appreciates the opportunity to provide comments and discuss the 60% Pipeline Alternatives and Soils / Staging Areas.

The Cocopah Indian Tribe along with council members and representatives from other interested tribes, visited the Topock area on February 21, to view and walk the Soil Staging areas proposed by PG&E and the alternative pipeline route for the Topock Compressor Station 60% groundwater remedy design. During this meeting and site walk, it was agreed that a table and map illustrating the staging and pipeline route would be produced and used to provide comments regarding the staging areas and pipeline route.

Attached you will find Cocopah's comments regarding the Pipeline route and Staging areas. The attachments are as follows:

- Figure 1 is a map illustrating the Staging areas and Pipeline
- Table 1: Cocopah Comments regarding Pipeline Points
- Table 2: Cocopah Comments regarding Soils Staging / Construction Areas

If you have any questions feel free to contact me at: Cell: 928-287-5042 or Office: 928-627-4849, or by email at CocopahTPM@Gmail.com

Thank vou

Edgar Castillo
Cocopah Indian Tribe
Topock Project Manager

Cc:
Aaron Yue, DTSC
Pam Innis, DOI
Jill McCormick, Cocopah Indian Tribe
Nora McDowell, Fort Mojave Indian Tribe
Dawn Hubbs, Hualapai Indian Tribe
Doug Bonamici, Colorado River Indian Tribes
Karen Baker, CHG, CEG, Chief, Geological Services Branch

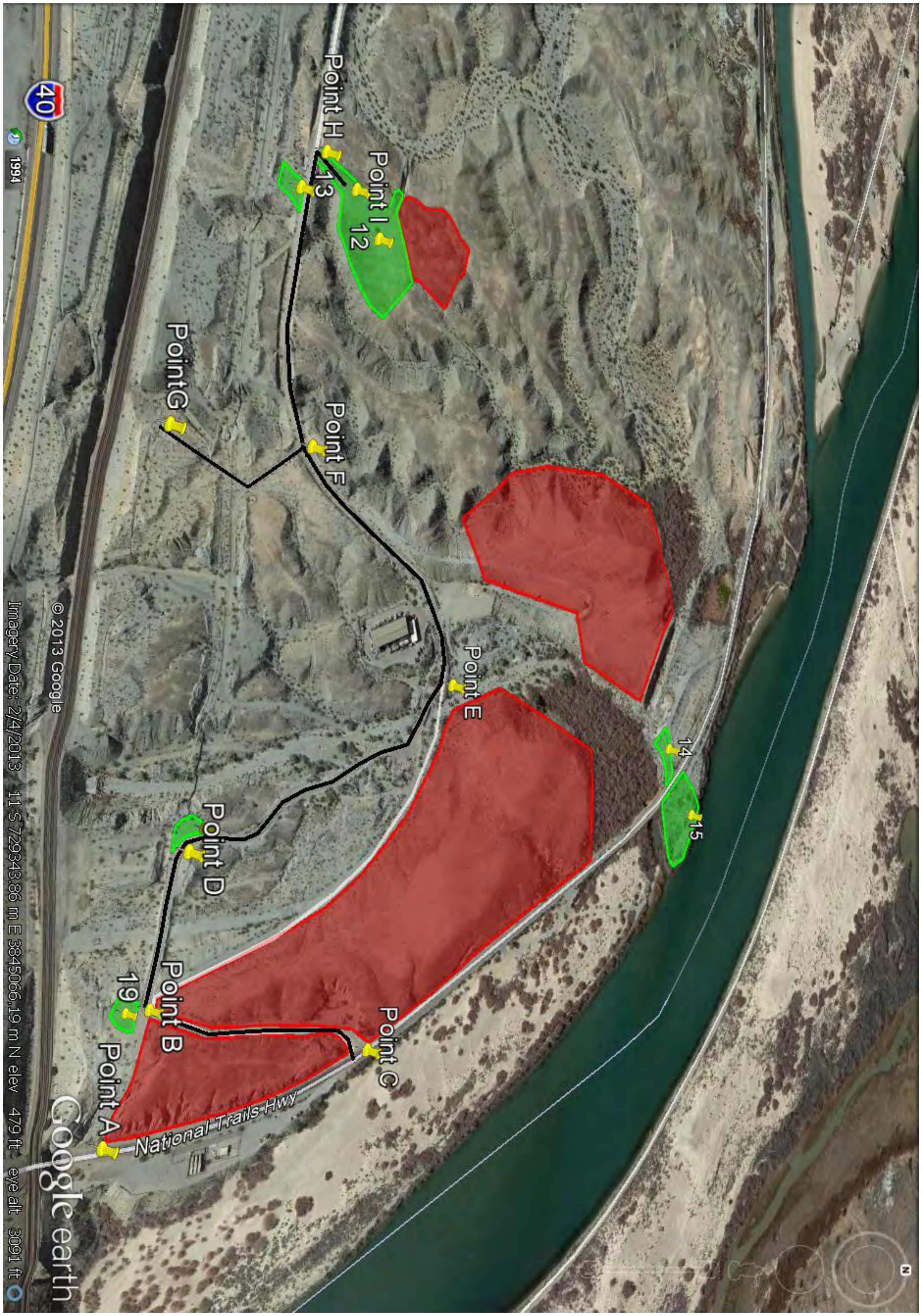


Figure 1: Red Areas = Cultural Sites
Green Areas = Soils Staging Areas
Black Line = Pipeline

Table 1: Cocopah Comments on the Pipeline Points

PIPELINE POINTS	ABOVE/BELOW GROUND	CONDITIONS OF USE COMMENTS
A TO B	Neither	Tribe's conclusion is that this is not an acceptable route for the pipeline. It is noted that there is significant damage to this area and this pipeline segment would cause more damage. The tribe recommends that this area be avoided.
C TO B	Above/Below	This segment intersects a large Cultural Resources Area. Any additional widening or cutting into the sides of the road is to be avoided as to not cause any damage to the cultural materials present on the slopes. All activity including staging, storage or personnel would be strictly limited to the roadway. Piping should go in the center of the existing roadway. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
B TO D	Above/Below	This segment is in an existing roadway. All activity including staging, storage or personnel would be strictly limited to the roadway. Piping should go in the center of the existing roadway. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
D TO E	Above/Below	This segment is in an existing roadway. All activity including staging, storage or personnel would be strictly limited to the roadway. Piping should go in the center of the existing roadway. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
E TO F	Above/Below	This segment is in an existing roadway. All activity including staging, storage or personnel would be strictly limited to the roadway. Piping should go in the center of the existing roadway. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
F TO G	Above/Below	This is a small area that contains archaeological site CA-SBR-11939. Cultural clearances with tribal monitors are requested, prior to and during construction. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.
F TO H TO I	Above/Below	This area is very close to cultural materials. Cultural clearances with tribal monitors are requested, prior to and during construction as with the previous point. All infrastructure materials to be removed five years after achieving acceptable Chrome VI levels.

Table 2: Cocopah Comments on the Soils Staging / Construction Areas

STORAGE/STAGING AREA	ACERAGE	LOCATIONS / NOTES	COMMENTS
1-5 Soils storage	11.1	All in Park Moabi Area	*Tribes said yes (CHPMP 1/14)*
6 Soils storage	0.67	Across from IM-3	*Tribes said no (CHPMP 1/14)*
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16	0.06		*Tribes said no*
17 ***This site is proposed for construction materials***	0.1		*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?
18	1.28		*Tribes said yes (CHPMP 1/14)*
19 ***This site is proposed for construction materials***	0.15	Located across from the southern tip of CA-SBR-219 Locus B (Maze). There is a better place to the west (down the slope) where there already exists a large level place with a well (MW25) Why not go there instead? Proposed IRL7 near- by. Also N (?).	*Tribes have questions:* 1. Modifications? 2. Fencing? With what? 3. Structures? 4. Blading, leveling, gravel import? 5. Lighting? Generators? 6. Berm cuts along road?

[1] National Register of Historic Places Eligibility Evaluation of CA-SBR-11862H, San Bernardino California, David D. Earle and Barry A. Price. Prepared by Applied Earthworks and Earle and Associates, submitted to Pacific Gas and Electric Co. September 2013.

Table 2: Cocopah Comments on the Soils Staging / Construction Areas (Cont. from page 5)

STORAGE/STAGING AREA	ACERAGE	LOCATIONS / NOTES	CONDITIONS OF USE COMMENTS
20 ***<u>This site is proposed for construction materials</u>***	0.1		*Tribes still need to visit this site*
21 Construction Staging	11.57	Compressor Station	*Tribes said yes (CHPMP 1/14)*
22 Construction Staging	0.58		*Tribes said yes (CHPMP 1/14)*
23 Construction Staging	0.4		*Tribes said yes (CHPMP 1/14)*
24 Construction Staging	0.55		*Tribes said yes (CHPMP 1/14)*
25 Construction Staging	0.25		*Tribes said no (CHPMP 1/14)*
26 Construction Staging	0.74		*Tribes said yes (CHPMP 1/14)*
27 Construction Staging	0.61		*Tribes said yes (CHPMP 1/14)*
28 Construction Staging	1.2		*Tribes said yes (CHPMP 1/14)*
29 Construction Staging	0.63		*Tribes said yes (CHPMP 1/14)*

From: Doug Bonamici [mailto:dbonamici@critdoj.com]
Sent: Monday, March 10, 2014 2:36 PM
To: Yue, Aaron@DTSC
Cc: howard.magill@crit-nsn.gov; Wilene Fisher-Holt; Margaret R. Eggers; Nora McDowell; Dawn Hubbs; Edgar Castillo; Charlie Schlinger; Baker, Karen@DTSC
Subject: Comments on Noise/ Vibration and Pipeline Routing

Mr. Yue, the Colorado River Indian Tribes will not be submitting further comment for the 60% Design phase on the Noise and Vibration issues nor on the Pipeline Routing issues at this time. We have participated in the discussions of those issues, and are satisfied the DTSC, DOI and PG&E have heard our concerns directly, and through the other Tribal comments. We will consider adding further input as the design process moves forward.
Thank you for your efforts in this regard. db

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PG&E's Responses to Tribes' Questions about Staging Areas #14, #15, #17, and #19

Construction Staging Area #14

1. Is it temporary?

Response: Yes, all construction staging areas are temporary by nature, and are specifically set up to provide support for specific construction activities in specific areas.

2. Fencing? With what?

Response: Yes, some construction staging areas are anticipated to include temporary fencing for security and safety reasons. Fencing will likely be chain link fences with posts or panels.

3. SHPO Clearance?

Response: In accordance with the Programmatic Agreement, it is PG&E's understanding that the groundwater remedy will require BLM review and concurrence prior to start of construction. SHPO consultation is also likely to be necessary, consistent with the Programmatic Agreement's Consultation Protocol.

4. What Activities?

Response: Staging areas (also called support zones) are located adjacent to or near a primary work zone where actual construction activities will take place. Staging areas will be used for location of temporary facilities such as portable toilets and breaks areas. Staging areas are also used for lay-down of construction equipment (including heavy equipment), materials, supplies, and tools needed for construction activities in the primary work zones. In addition, most temporary stockpiling (less than 90 days) of displaced soils/materials will take place in the staging areas. Management of displaced soils and materials will be in accordance with the Displaced Soils Management Protocol.

In addition, PG&E plans to conduct daily planning and health and safety meetings at the main construction yard and, as needed, in the support zones prior to commencing work. Staging areas will also serve as the communication and coordination center for emergency situations.

5. Lighting?

Response: Since staging areas, in general, are not intended to be staffed 24/7, PG&E does not consider night-time lighting at these staging areas to be necessary, except for limited circumstances such as when PG&E personnel or contractors need to enter the staging areas during nighttime hours because they must continue to work during the night on work that cannot be disrupted or suspended. If needed, temporary lighting may be powered by portable generators. PG&E will comply with the EIR mitigation measures to reduce impacts from construction lighting.

6. Extent of Staging Areas? From where to where?

Response: For practical reasons, a useful staging area would occupy an accessible, flat, well graded, and previously disturbed area while avoiding sensitive resources. The extent of staging areas will be field verified and demarcated prior to set up, with participation from qualified archaeological monitor(s) and biologist(s). Tribal monitors will be invited to participate in/or observe the demarcation of all staging areas.

7. What has BLM determined regarding eligibility and potential impacts to this area?

Response: A report titled National Register of Historic Places Eligibility Evaluation of CA-SBR-11862H, San Bernardino County, California (September 2013) was prepared by AE. The report concluded that significant historical associations of the site, and its representativeness as a historically significant type, were lost with the removal of the buildings and other features. This loss of integrity means that the site cannot be considered eligible for the NRHP under Criteria A or C; however, the archaeological remains at CA-SBR-11862H do meet standards of both significance and integrity with respect to NRHP Criterion D and the site is eligible for the NRHP under this criterion. PG&E understands that BLM has concurred with this recommendation.

Based upon current information, the construction staging area which may be sited within CA-SBR-11862H boundaries as part of the Project avoids the historical debris deposits that contribute to the property's significance. Therefore, BLM has concluded that this historic property would not be affected adversely. The BLM is seeking the concurrence the CA SHPO regarding the determination of eligibility to the NRHP and the determination of no adverse effect.

Construction Staging Area #15

1. Vegetation Removal? Tribes do not want vegetation removed.

Response: Consistent with the EIR mitigation measures to reduce visual impacts, PG&E will work to avoid and protect woody or perennial plants in this area. PG&E assumes that occasional removal of weeds, if needed for the purpose of staging is acceptable. Again, as mentioned above, the extent of staging areas will be verified and demarcated prior to construction set up, with participation from qualified biologist(s). Tribal monitors will be invited to participate in/or observe the demarcation of all staging areas.

2. Wider access/modifications? Tribes do not want that.

Response: PG&E does not intend to modify or widen access to this area for use as construction staging. For access to this area, PG&E plans to open up the existing entrance by moving the large rocks that currently block the entrance. The precise locations of the rocks will be determined in the field concurrent with the pre-construction field verification and demarcation of the staging area.

3. Watchmen? Guards? Restroom?

Response: As mentioned above, PG&E does not intend to staff construction staging areas, therefore, there will not be watchmen and guards stationed at the staging areas. It is likely that there will be portable toilets at some staging areas, although, which staging areas will have these facilities and their precise locations within the staging areas have yet to be determined.

4. What activities?

Response: See response to #4 above.

5. Lighting?

Response: See response to #5 above.

6. When was this area last surveyed for cultural materials?

Response: This area was last formally surveyed in 2004 and reported in AE's 2007 report. Since that time, the area has been revisited during the course of considering this area as a staging area. Per PG&E's standard process, the area will be reexamined prior to any ground disturbing activities.

7. Extent of Staging Areas? From where to where?

Response: See response to #6 above.

Construction Staging Areas #17 and #19

1. Modifications?

Response: PG&E does not intend to improve or modify these areas.

2. Fencing? With what?

Response: Unlike other staging areas, these two areas are currently used as turnaround and parking areas for vehicle traffic along the access road. Therefore, to preserve this functionality, PG&E does not intend to install temporary fences in these two areas.

3. Structures?

Response: PG&E does not intend to install any structures in these two areas.

4. Blading, leveling, gravel import?

Response: PG&E does not intend to make surface improvements to these areas. Gravel import is neither planned nor anticipated to level or blade these areas.

5. Lighting? Generators?

Response: See response to #5 above.

6. Berm cuts along road?

Response: PG&E does not intend to do any berm cuts along road.

For Area #19, the Tribes also had the following question: "There is a better place to the west (down the slope) where there already exists a large level place with a well (MW25). Why not go there instead? Proposed IRL-7 nearby. Also N (?).

Response: The level place to the west of Area #19 serves as an access road used by BNSF, Southwest Gas Company, and PG&E gas transmission department. The access to their facilities cannot be impeded by PG&E's remediation work. Although a small portion of this area may be periodically useful and available for PG&E remediation work, these other utility constraints and limited access using a steep driveway and tight turning radius led PG&E to conclude that this potential staging area has little value to the project.

PUNCH LIST #5 FROM SEPTEMBER 17 – 18 TWG MEETING

60% Design, Appendix L – Volume 4: Soil Management Plan

Comment FMIT-194, Hualapai/Chemehuevi/Cocopah/CRIT-144 - Potential Soil Storage Location Decision Matrix

The current groundwater EIR does not specifically address long-term storage of soil within the APE. Please indicate how impacts to cultural and visual resources associated with long-term soil storage will be evaluated. While stakeholder input has been requested in regards to potential locations for soil storage it is not clear how the final decision will be made. This process needs to be transparent. <u>Therefore please provide a matrix which includes all parameters used in the decision/rationale behind final storage locations that will be discussed with the Tribe</u>. Parameters that should be transparently discussed in regards to the final soil storage location would include proximity to cultural resources, whether access routes are adjacent to cultural resources, distance of storage to point of origin and will potential locations have any visual impacts that are not currently addressed in the GW EIR

Potential Soil Storage Location Decision Matrix

Potential Soil Storage and Staging Locations	Total Area (acres)*	Approximate distance to storage location from remedy construction area	Acceptable to Tribes?	Impacts to Cultural Value	Potential visual impacts of storage location	Access to storage location (existing or improvements needed)	Potential ecological impacts of storage location
Soil Storage Areas (shown in yellow on map)							
1 - Park Moabi RV Storage Area	2.11	2 miles	TBD	TBD	TBD	Good No improvements needed	Low Located in relatively unvegetated/disturbed area; not within sensitive plant or wildlife habitat
2 - Park Moabi RV Storage Area	1.94	2 miles	TBD	TBD	TBD	Good No improvements needed	Low Located in relatively unvegetated/disturbed area; not within sensitive plant or wildlife habitat
3 - Park Moabi RV Storage Area	5.09	2 miles	TBD	TBD	TBD	Good No improvements needed	Low Located in relatively unvegetated/disturbed area; not within sensitive plant or wildlife habitat
4 -Paintball Area	0.91	2 miles	TBD	TBD	TBD	Good Minor improvements needed	Low Located in relatively unvegetated/disturbed area; not within sensitive plant or wildlife habitat
5 - BOR OHV Staging Area	1.45	2 miles	TBD	TBD	TBD	Good No improvements needed	Low Located in relatively unvegetated/disturbed area; not within sensitive plant or wildlife habitat

Potential Soil Storage and Staging Locations	Total Area (acres)*	Approximate distance to storage location from remedy construction area	Acceptable to Tribes?	Impacts to Cultural Value	Potential visual impacts of storage location	Access to storage location (existing or improvements needed)	Potential ecological impacts of storage location
6 - Area near IM-3 treatment plant	0.67	0-1 mile	TBD	TBD	TBD	Good No improvements needed	Low Located in relatively unvegetated/disturbed area; not within sensitive plant or wildlife habitat
7 -Area near IM-3 treatment plant	0.28	0-1 mile	TBD	TBD	TBD	Good No improvements needed	Low Although appears to be located within vegetation polygon, actual location is in unvegetated area adjacent to access road
8- Area near IM-3 treatment plant	0.17	0-1 mile	TBD	TBD	TBD	Good No improvements needed	Low Although appears to be located within vegetation polygon, actual location is in unvegetated area adjacent to access road

* - Estimated total acreage for the subject area (actual area available for remedy use will be less and will need to be verified).

Proposed Remedy Construction Staging Areas Matrix

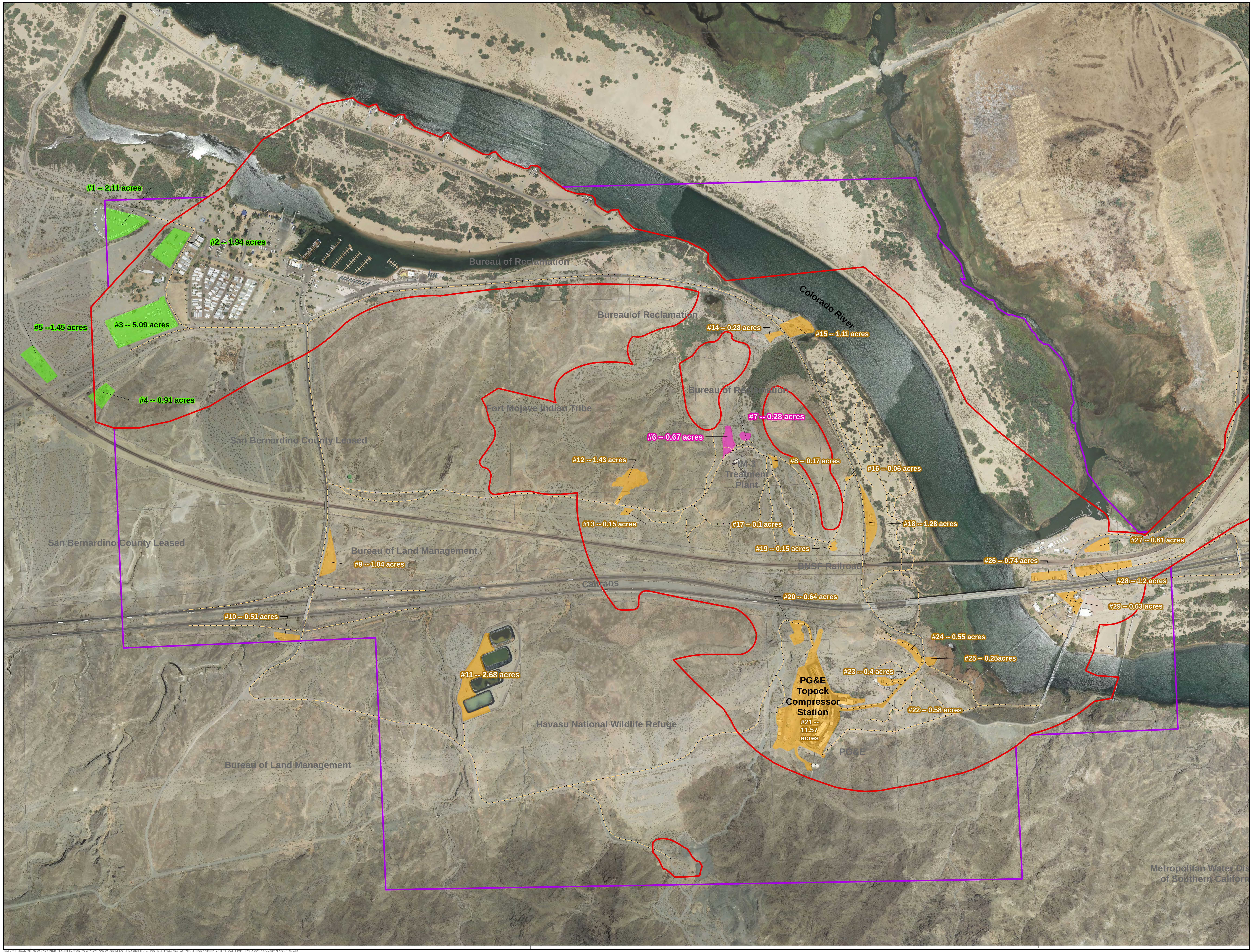
Staging Locations	Total Area (acres)*	Acceptable to Tribes?	Impacts to Cultural Value	Potential visual impacts of staging location	Potential ecological impacts of storage location
9	1.04				Low Located in disturbed area; not within sensitive plant or wildlife habitat
10	0.51				Low Located in disturbed area; not within sensitive plant or wildlife habitat
11	5.69				Low Located in disturbed area; not within sensitive plant or wildlife habitat
12	1.43				Low Located in disturbed area; not within sensitive plant or wildlife habitat
13	0.15				Low Located in disturbed area; not within sensitive plant or wildlife habitat
14	0.28				Low Located in disturbed area; not within sensitive plant or wildlife habitat

Staging Locations	Total Area (acres)*	Acceptable to Tribes?	Impacts to Cultural Value	Potential visual impacts of staging location	Potential ecological impacts of storage location
15	1.11				Low Located in disturbed area; not within sensitive plant or wildlife habitat
16	0.06				Low Located in disturbed area; not within sensitive plant or wildlife habitat
17	0.1				Low Located in disturbed area; not within sensitive plant or wildlife habitat
18	1.28				Low Located in disturbed area; not within sensitive plant or wildlife habitat
19	0.15				Low Located in disturbed area; not within sensitive plant or wildlife habitat
20	0.64				Low Located in disturbed area; not within sensitive plant or wildlife habitat

Staging Locations	Total Area (acres)*	Acceptable to Tribes?	Impacts to Cultural Value	Potential visual impacts of staging location	Potential ecological impacts of storage location
21 - Compressor Station	11.57				Low Located in disturbed area; not within sensitive plant or wildlife habitat
22	0.58				Low Located in disturbed area; not within sensitive plant or wildlife habitat
23	0.4				Low Located in disturbed area; not within sensitive plant or wildlife habitat
24	0.55				Low Located in disturbed area; not within sensitive plant or wildlife habitat
25	0.25				Low Located in disturbed area; not within sensitive plant or wildlife habitat
26	0.74				Low Located in disturbed area; not within sensitive plant or wildlife habitat

Staging Locations	Total Area (acres)*	Acceptable to Tribes?	Impacts to Cultural Value	Potential visual impacts of staging location	Potential ecological impacts of storage location
27	0.61				Low Located in disturbed area; not within sensitive plant or wildlife habitat
28	1.2				Low Located in disturbed area; not within sensitive plant or wildlife habitat
29	0.63				Low Located in disturbed area; not within sensitive plant or wildlife habitat

* - Estimated total acreage for the subject area (actual area available for remedy use will be less and will need to be verified).



LEGEND

- EIR Project Area
- Area of Potential Effects (APE)
- Proposed Access Routes
- Potential Soil Storage Area/ Proposed Staging Area for Remediation Project
- Proposed Staging Areas for Remediation Project
- Areas #6 and #7 are proposed by DOI for consideration as soil storage areas only from the IM-3 decommissioning and sampling activities (see comment #775 DOI-320). PG&E proposes these two areas as staging areas during construction of the remedy and decommissioning of IM-3 facilities. Area #6 is also proposed as a waste management area for non-hazardous waste only during decommissioning of IM-3 (see Draft IM3 Decommissioning Work Plan). Note that the FMIT has opposed the use of these two areas for any remediation related purposes. See FMIT comment on 60% design, #291 FMIT-44

Notes:

1. PG&E may use all or a subset of these potential temporary staging areas during remedy construction.
2. Note that in compliance with EIR mitigation measure CUL-1a-9 as well as PA and CHPMP mitigation measures, the proposed access route west of National Trails Highway is located in an existing, previously disturbed, access road. The location of the access road was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10 and PA and CHPMP mitigation measures

N

0 300 600 1,200 Feet

Updated November 2013

FIGURE 7.6-1
PROPOSED STAGING AREAS, CONSTRUCTION YARD, AND ACCESS ROUTES

GROUNDWATER REMEDY BASIS OF DESIGN REPORT
INTERMEDIATE (60%) DESIGN
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Attachment H: RTC #317-321

PG&E's Response to TRC Technical Memorandum on Appendix A8 and Tribe's Letter to close-out unresolved noise and vibration comments

Responses to Charlie Schlinger's Memo (12/10/13)

Comment Item 317 addressed Appendix A8 and requested a narrative "that explains how these baseline data will be used in any decision-making process(es), and as a part of Mitigation Measures NOISE-1, NOISE-2 or NOISE-3". The PG&E response to this comment provides some background as to why the supplemental data were collected, and how these data are part of documenting site conditions prior to remedy implementation. This background information helps with the broader understanding of the work done so far, and should be included in the upcoming 90% BoD report. However, the RTC response does not explain how these data will be used. As I considered this comment, the response, and reviewed the Appendix A8 data, I identified several additional pertinent questions:

A) I understand that there was considerable discussion about the meaning of the term "baseline". Will the meaning of "baseline" as used in Appendix A8 be clarified and agreed upon as part of resolution of this or other sound/noise-related comments?

RESPONSE: *As discussed at the November 19-20, 2013 TWG meeting, baseline site conditions means conditions of the site prior to remedy implementation.*

B) It seems clear that some parties decided (and I concur) that the sound level data gathered as part of EIR development were insufficient, and therefore the additional data were acquired. Is there a record of that discussion and decision?

RESPONSE: *There was no determination that sound level data gathered as part of EIR development was insufficient.*

C) The response to the comment indicates that these noise data are available for use, if needed and as appropriate. The response needs to indicate how the data will be or should be used.

RESPONSE: *Until there is an actual construction or operational noise concern, PG&E cannot opine on how or if this data will be useful. Rather, this was a pro-active step taken by PGE to be as prepared as possible for a meaningful discussion should the need arise.*

D) Why were no frequency (spectral) characteristics of the measured noise determined? Also, why were no sound recordings made, e.g., of events that exceed a certain threshold? My understanding is that the 831 sound level meter can readily collect this information, which is most informative, for example, when trying to understand if the noise has a characteristic frequency range, or, to identify the source(s) of loud noise(s) that influence the record at a site.

RESPONSE: *The EIR identified the applicable criteria as A-weighted, therefore the measurement results were summarized on the A-weighted scale. Should the need arise to evaluate an actual concern, additional data collection and analysis can be conducted.*

Comment Item 318 requested a tabular inventory and map of noise source locations. I very much appreciate PG&E's willingness to provide this – as indicated in the PG&E Response to 60% Design Comments column.

A challenge of this project is to quantify, in advance, the environmental noise impact(s) of the remedy. Clearly, the FEIR made an effort to do this, but that attempt was done well in advance of actual knowledge of the remedy design. Now that design is well underway, it would make sense to re-valuate the likely noise impacts based on the actual design. I expect that noise impacts during routine operation and maintenance will be minor – assuming that permanent stationary noise sources are selected for low noise emission or are buried, enclosed, etc. I expect that noise impacts during the main construction period and during decommissioning will be significant. Similar activities may also intermittently occur during the life span of the remedy due to repairs or equipment updates or replacements. Until mobile and stationary noise source locations are identified, and source noise levels are quantified, cumulative environmental noise impacts on noise-sensitive Tribal (or other) receptors cannot be properly anticipated, forecast or assessed. It is probably worthwhile to note on the map or inventory that not all noise sources will be generating noise at the same time.

> **RESPONSE:** *PG&E agrees that the quantitative sound levels from the project operations will likely be low. Construction including decommissioning are considered short term, isolated noise events. The EIR analyzed the potential noise impacts from the construction and operation of the project and established mitigation measures. PG&E is committed to complying with the thresholds established in the EIR and implementing the mitigation measures.*

Comment Item 319 concerns how the selection and specification of equipment will utilize noise restrictive criteria. This focuses on the selection of all equipment with specific consideration for its capacity to generate noise. The PG&E response addresses this partially, but the response language seems to focus on equipment selection for the permanent (life-of-project) infrastructure, whereas the response needs to address equipment selection for each of the construction, operation & maintenance, and, decommissioning periods. The PG&E comment response references Section C.11 in Appendix C – Design Criteria (page C-32) of the 60% BoD Report, and I have several questions concerning that section, which is reproduced below.

1) A design margin of 3 to 5 A-weighted decibels (dB[A]) will be considered in all noise design criteria.
2) In conformance with the EIR mitigation measures NOISE-3 and CUL-1a-10, the operational noise design criteria for the project will be per San Bernardino County Development Code 83.01.080 for acceptable exterior noise standards for place of worship, which is 55 dB(A) Leq daytime (7 a.m.-10 p.m.) and 45 dB(A) Leq nighttime (10 p.m.-7 a.m.) (Leq is the equivalent average hourly noise level) (see page 4.9-24 of the EIR [DTSC 2011]). The noise measurement locations will be at the edge of the Maze closest to the subject facilities and at the short-term ambient noise measurement locations (ST-1, ST-2, and ST-3) in Exhibit 4.9-2 of the certified EIR (DTSC 2011).
3) For remedy facilities in Arizona, the operational noise design criteria will be 60 dB daytime and 50 dB nighttime average at closest residences (per current Mohave General Plan, Exhibit V-5, Maximum Noise Levels for Various Land Use).
4) For remedy facilities on the Refuge, the operational noise design criteria will be 60 dB.
5) For remedy facilities located on the Compressor Station and within PG&E property, the operational noise design criteria will be consistent with the noise environment at the Station, per San Bernardino County Development Code 83.01.080 for industrial land use, 70 dB(A).
6) The construction noise criteria will conform to San Bernardino Development Code and Mojave County standards, as well as the EIR mitigation measures NOISE-1, -2, and -3.
Per San Bernardino County Code Division 3 Chapter 83.01.080, temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays, are exempt from noise limits.

> A) Regarding the first bulleted item, please explain what is meant by this statement. How will this design margin be applied, and what facilities are being designed using the margin?

RESPONSE: *Anticipated overall operational sound levels for the groundwater remediation project will be compared to the criteria stated in Items 2 through 5 above. The design goal will be that the operational sound levels are 3-5 dBA less that the stated criteria. That is, as the project proceeds through detailed design, it will not be designed right up to the stated criteria. This is considered good engineering practice. The facilities are those related to the remedy, are stationary and of non-emergency nature.*

B) Concerning the second bulleted item, operational noise criteria are identified, and noise measurement locations that will supplement existing locations ST-1, ST-2 & ST-3 are called out. Will the Tribes be consulted in the selection of these supplemental locations? Will these supplemental locations and the existing ST locations be utilized for construction-period noise monitoring? Will background noise levels be established at these supplemental locations in advance of the construction period – similar to what is being done for Short-Term locations ST-1, ST-2 & ST-3? To what does the term “subject facilities” refer?

RESPONSE:
Once the groundwater remedy is in operation, should the Tribes have concerns about operational noise that is generated by the remedy, PG&E will work with the Tribes to select measurement locations at the edge of or within the Maze, if the Tribes desire, and conduct monitoring at these selected locations. Subject facilities noted under Item 2 refer to remedy facilities that are stationary and of non-emergency nature.

Item 6 above pertains to noise generated during construction. With regard to noise monitoring during construction, PG&E will comply with the EIR mitigation measure NOISE-2c which states that “When construction activities are conducted within the distances outlined above (i.e., 1,850 feet and 5,830 feet from California receptors and 330 feet and 735 feet from Arizona receptors for daytime and nighttime noise, respectively) relative to noise-sensitive uses in the project area, noise measurements shall be conducted by a qualified acoustical consultant at the nearest noise-sensitive land use relative to the construction activities with a sound level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 of Type 2) to ensure that construction noise associated with the project component complies with applicable daytime and nighttime noise standards.” Coordination and communication with Tribes on all project noise-generating activities will be in accordance with the Draft CIMP protocol for CUL-1a-8h, which is intended to reduce auditory impacts during remedy implementation.

C) In the fourth bulleted item, will noise data, if and when measured, be collected at the property line of the Refuge or at other locations, possibly within the Refuge? Where, specifically?

RESPONSE: *PG&E does not anticipate operation of this project will result in an exceedance of the design criteria. Should a specific and actual concern arise during operations, PG&E will conduct appropriate measurements to address that concern. It would be purely speculative to identify specific locations at this time as there is no reason to anticipate a specific concern.*

D) Is the 70 dB(A) noise criterion, identified in bulleted item 5, an Leq value, and if so is it a daytime, nighttime or 24-hr value?

RESPONSE: *San Bernardino County Development Code 83.01.080, specifically Table 83-2, establishes an Leq metric during both the day and night. It is reproduced below:*

Table 83-2 Noise Standards for Stationary Noise Sources		
Affected Land Uses (Receiving Noise)	7 am-10 pm Leq	10 pm-7 am Leq
Residential	55 dB(A)	45 dB(A)
Professional Services	55 dB(A)	55 dB(A)
Other Commercial	60 dB(A)	60 dB(A)
Industrial	70 dB(A)	70 dB(A)
Leq = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically 1, 8 or 24 hours.		
dB(A) = (A-weighted Sound Pressure Level). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.		
Ldn = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10 pm to 7 am). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.		

E) The sixth bulleted item, states (correctly) that the San Bernardino County Code exempts temporary construction, maintenance and repair activities from noise limits provided that the activity occurs between the hours of 7 AM and 7 PM, Sundays and Federal holidays excluded. (They have a similar exemption for vibration.) The inclusion of this statement in the design documents is troubling, because it is at odds with Section 4.9.3.2 of the FEIR (Thresholds of Significance), in which this basically unlimited noise threshold was rejected. Why then, is it used as a noise criterion in the Basis of Design report?

RESPONSE: *This was not intended to be confusing. Construction noise was appropriately identified as potentially significant and mitigation measures were established in "Mitigation Measure NOISE-2: Project Generated Construction-Related Noise Levels."*

Comment Item 320 concerns the importance of meteorological effects on noise propagation. The comment response appears to address stationary/permanent noise sources during the operational period, but it should be expanded to address mobile and transient sources, such as those used during well construction and rehabilitation, because those latter sources will generate higher noise levels, and quite possibly at lower frequency.

RESPONSE: *Construction equipment noise levels and ranges, as well as potential influence of meteorology on sound propagation are well documented. Construction noise for the project was appropriately identified as potentially significant and mitigation measures were established in "Mitigation Measure NOISE-2: Project Generated Construction-Related Noise Levels."*

Comment Item 321 as initially worded, concerned what was felt to be a nearly complete absence of data interpretation and discussion in Appendix A8. Additional clarification to the comment was provided subsequent to the comment period. The PG&E and DTSC responses provide sought-after background on the various metrics used in the Appendix A8 report, and on the ST site selection, and that is much-appreciated. While one could have made their own assumptions, quite possibly erroneous, it is most helpful to have an explanation of what was measured, averaged, statistically-developed, and recorded. This information and discussion should be included in Appendix A8 of the 90% BoD Report. The comment response mentions the November 8, 2012, PG&E Topock Groundwater Remediation Project Sound Level Measurements Protocol, which, I recollect, perhaps incorrectly, was issued (based on its date) after supplemental sound level measurements had already commenced. Please clarify if the protocol was developed before the August 2012 measurement period and if so, was it distributed to all interested parties?

> **RESPONSE:** *The protocol was developed prior to the August 2012, and was distributed to interested parties in November 2012. The Tribes were notified of the field work associated with the August 2012 and subsequent noise monitoring events.*

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March 10, 2014 **HDCR File: 2014-662**

VIA ELECTRONIC MAIL
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Re: Invitation to Review and Comment on Unresolved Noise- and Vibration-Related Comments

Dear Mr. Yue:
On behalf of the Hualapai Tribe, we appreciate being able to respond to unresolved noise and vibration related comments. With the assistance of the Technical Review Committee, Hualapai supports the following language usage for the below stated comments in regards to the close out for the 60% Design.

<u>Comments 260 & 263</u>

Use the following language for closure of each of these comments:

> The DTSC response indicates that Noise and Vibration-Sensitive Land Uses in section 4.9.1.5 did identify the Topock Cultural Area as a sensitive land use. We note that, apparently, no impacts to this use were analyzed. The development of the 90% Basis of Design Report should include a consultation with the Tribes to consider and identify vibration- and noise-sensitive Tribal uses and users.
>
> Comment closed. The Tribes would request that as the sound monitoring details are resolved, the usage of the Topock area as a location of deep spiritual meaning and associated usage would be taken into account to the fullest extent possible.

Comments 320 & 321

Use the following additional language for closure of each of these comments:

1. Revise the noise measurement protocol in consultation with the Tribes. Specifically, the protocol needs to include the collection and archiving of noise measurements that include spectral content (noise level as a function of frequency, which consist of unfiltered and un-weighted, or un-averaged, raw data, aka band spectra), and noise recordings accompanied by a spoken or written narrative addressing what noise and sounds are being heard.
2. Following the above revised protocol, collect additional noise data during the summer and early winter of 2014.
3. Adopt the protocol for use on the project, going forward.

Comment closed.

Comment 322

Comment 322 should be considered as closed.

We appreciate our on-going consultations and collaborations with the Topock Remediation Project and look forward to meaningful dialogue through-out the up-coming years. If you have any concerns please feel free to contact myself, or Dawn Hubbs, Program Manager and we will be happy to assist you.

Sincerely,

Loretta Jackson-Kelly

Loretta Jackson-Kelly, Director and Tribal Historic Preservation Officer
Hualapai Department of Cultural Resources

Cc:
Mr. Rudy Clark, Sr., Councilman, Hualapai Tribal Council
Mr. Robert Bravo, Councilman, Hualapai Tribal Council
Karen Baker, CHG, CEG, Chief, Geological Services Branch

Item	Comment Number	Section/ Page	Reference Text	60% Design Comment	PG&E Response to 60% Design Comments	DTSC Response to 60% Design Comments	DOI Response to 60% Design Comments	Tribe Response to 60% Design Comments	Final Comment Resolution
General Comments									
260	FMIT-36 Hualapai-25 Chemehuevi-25 Cocopah-25 CRIT-25	Table 6.1-1 p. 6-37	Noise-1a	Vibration-sensitive land uses are assumed to consist only of residential and mobile home parks. Based on this assumption Tribal land uses are neglected. Tribal land use must be considered.	The stated assumption is consistent with the certified EIR (see page 4.9-20), and was expressly mentioned in both the 30% and 60% designs. No comments were received on this topic in the 30% design.	Noise and Vibration-Sensitive Land Uses in section 4.9.1.5 which did identify the Topock Cultural Area as a sensitive land use. NOTE TO KEEPER OF THE MATRIX: THIS DTSC RESPONSE, AS PRESENTLY WORDED, APPEARS TO BE INCOMPLETE (COMPARE TO THE DTSC RESPONSE FOR ITEM 263, BELOW.)			This comment and the responses were discussed at the December 12, 2013 TWG telecon.
263	FMIT-39 Hualapai-28 Chemehuevi-28 Cocopah-28 CRIT-28	Table 6.1-1 p. 6-38	Noise-2c	While vibration-sensitive receptors are discussed and identified as part of Noise-1, there is no similar discussion and identification of noise- sensitive receptors.	The certified EIR defined noise sensitive receptors in Chapter 4.9.1.5 (Existing Noise Environment, page 4.9-5).	Noise and vibration- sensitive receptors are discussed in the Noise and Vibration-Sensitive Land Uses section 4.9.1.5 which did identify the Topock Cultural Area as a sensitive land use.			This comment and the responses were discussed at the December 12, 2013 TWG telecon.
320	FMIT-53 Hualapai-39 Chemehuevi-39 Cocopah-39 CRIT-39	Append A8		The important effect(s) of meteorological conditions on the long-range propagation of sound should be addressed.	Meteorological effects are most pronounced for elevated sources or very loud sources, particularly those with strong low frequency content (such as a train). The operational sources of noise associated with this project are primarily located within buildings or underground, therefore their sound emissions are minimized and are not elevated. This project does not utilize equipment which is known to emit high levels of low frequency noise (such as train engines or unsilenced simple-cycle combustion exhaust stacks). See also response to TRC's (Charlie Schlinger) memorandum dated December 10, 2013, included in **Attachment H**, at the end of this table.				Written comments on the responses to this comment were received from the TRC (Charlie Schlinger) on November 15, 2013. PG&E provided a response to the written comment on December 10, 2013 (see memo included in **Attachment H**, at the end of this table).
321	FMIT-54 Hualapai-40 Chemehuevi-40 Cocopah-40 CRIT-40	Append A8 p. 1 and Figure 1	*The sound measurement locations were selected near the short term measurement locations in the Final Environmental Impact Report (FEIR) (DTSC,2011).*(shown in Exhibit 4.9-2 as ST-1, ST-2, and ST-3) (see Figure 1)	The three sites, ST-1, ST-2 & ST-3, have quite different levels of background sound levels and time—distributions, but this is not discussed. The report as it stands provides practically no quantitative evidence about the nearby noise sources and their (expected/measured) spatial contribution to the background noise. Such information is crucial to properly analyze and understand the highly variable background noise which was measured across the three sites. Further, it is unclear as to why these sites were chosen. *"PGE asked for clarification of this comment prior to response. The following clarification of comment was obtained from TRC on October 17, 2013. Response addresses the clarified comment.* *It is unclear what the data entries included in*	American National Standards Institute (ANSI) S1.4 Type 1 (precision) sound level meters were used to monitor ambient sound levels. The sound level meters were programmed to report the average (L_{eq}) and statistical sound level	A specific rationale for the selection of individual sites for noise measurements was not provided in the Groundwater Final EIR. Based on the locations of the monitoring locations, the following can be inferred: ST 1 was chosen for its proximity to Maze Loci A; ST 2 was chosen for its proximity to Maze Loci C; ST 3 was chosen for its proximity to residences and traffic intersection at Park Moabi; LT A was chosen to provide ambient noise data from I-40; and LT B was chosen to provide ambient noise data from the BNSF rail line. It can also be inferred from the text in the Final		The Tribe was not involved in the selection of the sites in the FEIR and the 2012-2013 study. The Tribes also note that there is no noise monitoring plan.	Written comments on the responses to this comment were received from the TRC (Charlie Schlinger) on November 15, 2013. PG&E provided a response to the written comment on December 10, 2013 (see memo included in **Attachment H**, at the end of this table).

				Appendix A8 Tables (1 & 2) represent? It is assumed that these data represent averages of other numbers presumably numbers in the Appendices (C-H) of Appendix A8. Please confirm if this assumption is correct. In addition it is not clear what the numbers in Appendices C-H represent? Presumably, they too are "averages" of other numbers - these latter numbers probably being what was actually measured. Please provide additional detail that allows the reader to understand what was actually measured and for what duration(s). That is, what are the basic measurements for this baseline sound characterization, and what "averaging" methods were used to develop the tabular summary information?	metrics (Leq, L50, and L90) at hourly intervals. The sound level meters continuously monitor the sound levels during each hourly interval and automatically calculate and report the average and statistical levels at the conclusion of the hourly interval. This process repeats continuously until the meters are manually turned off or the batteries are depleted and the meter automatically turns off. Appendices C through H present the data reported by the sound level meters in tabular and graphical format. The data in Table 1 is a summary of the data presented in Appendices C through H. Table 1 presents the maximum and minimum hourly Leq sound pressure level and corresponding wind speed for each monitoring location during both the daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) periods for both the summer and winter monitoring events. For example, the data presented in Appendix C (ST-1, August 2012) was reviewed to identify the maximum and minimum L_{eq} during the daytime and nighttime periods. These maximum and minimum levels were summarized for in Table 1 along with the wind speed that occurred during those maximum and minimum periods for ST-1 during August 2012. Table 2 presents the same sound pressure level data that is in Table 1 alongside the data collected from the 2008 EIR (the wind speed which was reported in Table 1 was omitted from Table 2 to enhance readability of Table 2). Table 2 shows that the short-term data collected for the 2008 EIR is within the range of the longer-term data collected over both a summer and winter period. Had the 2008 EIR sound level data fallen substantially outside the range of that recorded during this longer term monitoring event, its reproducibility could have been questioned. This did not occur. That is, there was nothing anomalous or spurious occurring during the time the sound level data reported in the 2008 EIR was collected.	EIR that the five locations were identified in recognition of the existing noise environment associated with the site (i.e., the diversity of background sound levels that exist on the site) and the existing noise-sensitive land uses. Further, because intervening topography exists between the compressor station and other portions of the project areas in the form of mesas that generally shield noise-sensitive receptors from full exposure of current on-site operations, multiple representative sites for ambient noise measurements were necessary. To accurately describe potential noise related impacts, the Final EIR used the ambient noise survey data from the individual locations to determine impacts to nearest sensitive receptors from the proposed project (i.e., the data collected for the three sites was not averaged). The normalization of the data described above, was conducted for individual sites only.			
				Site selection is a critical matter when it comes to developing a baseline. In the case of noise on this project, 3 sites were selected, with very little basis/justification provided in the FEIR. (The initial response to comments for this comment goes a long way in providing some explanation, but it is not complete, as ST-1 and ST-2 are indeed located on "mesa" tops (upland areas) and one, ST-3, is located down off of the "mesa",	These sites were chosen by the EIR preparer for noise measurements because mesas that generally shield noise sensitive receptors from full exposure of operations that were occurring when the EIR was prepared, exist between the compressor station and other portions of the project areas (see FEIR, page 4.9-5). Additional data				

				at a street intersection.) Please provide additional detail regarding what is it about these sites that is representative and meaningful when it comes to baseline noise measurements? Why are these locations appropriate for developing the baseline sound characterization? *The reporting in Appendix A8 is too clinical and terse; there are no more than a half-dozen sentences given to the discussion of results, mainly with an eye toward wind effects on noise measurements. While there are essential footnotes related to measured wind speed, which is highly relevant to noise measurements, there is no interpretation and discussion of the numerical values in Tables 1-2, or in the Tables in Appendices C-H in terms of individual site location and proximity to known noise sources, time of day, actual noise from these sources, season, atmospheric conditions, topographic conditions, or any other factor known to influence the measurements.* *There needs to be clear communication, in the design documents, of how these most recent noise data, together with the FEIR noise data collected in 2008, will be used as part of the project design.*	was collected in proximity to these sites in 2012 – 2013. Agencies, Tribes, and Stakeholders were informed of this selection as documented in the *Sound Level Measurements Protocol Technical Memorandum* (Appendix B to the 60% BOD Appendix A8). See also response to comment #322 FMIT-55/Hualapai-41. The *Sound Level Measurements Technical Memorandum* in Appendix A8 is intended to report the supplemental data collected during the 2012-2013 event. Since the existing site conditions (e.g., noise environment, topographic condition) are well documented in the FEIR, that body of information is intentionally not repeated in this technical memorandum. If helpful, additional references to the FEIR can be added to this technical memorandum. See responses to comment #317 FMIT-50/Hualapai-36 and #319 FMIT-52/ Hualapai-38, as well as TRC's (Charlie Schlinger) memorandum dated December 10, 2013, included in **Attachment H**, at the end of this table.				
322	FMIT-55 Hualapai-41 Chemehuevi-41 Cocopah-41 CRIT-41	Append A8 p.1 and Photo 1 & 2		The 60% BOD Report Appendix A-8 noise measurement locations are reported to be "near" and "in proximity to" the certified EIR noise measurement locations. The meanings of these terms are ambiguous and need clarification. Why were the certified EIR noise measurement locations not used?	Precise GPS locations were not available for the locations used in the certified EIR. The 2012 – 2013 noise measurement locations were selected based on their suitability for a longer term noise measurement. All of these locations are within approximately 100 feet of the EIR noise measurement locations and are well within the same acoustical environment.			The Tribes were not involved in the selection of the sites in the FEIR and the 2012-2013 study. The Tribes also note that there is no noise monitoring plan.	This comment and response were discussed at the October 16-17, 2013 TWG meeting.

Appendix 2

This issue has its origins with DTSC's EIR requirement for very minimal 15-minute-duration acoustic measurements at 3 locations, ST-1, ST-2 & ST-3, which were not selected in consultation with the Tribes. Further, the protocol for EIR acoustic measurement was developed without Tribal consultation. To its credit, the EIR well-addressed and quantified known noise sources – the railway and interstate highway, and the data from those noise source measurements, provided in the EIR, forms a part of our understanding of the "noise-scape" at Topock.

As part of its design process, PG&E, apparently voluntarily and unilaterally, collected additional acoustic measurements, of much greater duration than those obtained as part of the EIR development. The protocol for these measurements was circulated to the stakeholders after the first half (August 2012) of the acoustic measurements had been completed. The sites consisted of the same 3 locations identified above.

This additional information goes part of the way toward remedying the situation, but that other vital information was not recorded. This comes down to a matter of measurement protocol.

In order to have a complete record of the baseline, it is essential to not only record 15-minute or hourly averages of noise levels, but to also record information on the frequency content of the noise being measured, to actually record typical identifiable noise, and to provide a written narrative that explains the origins (railroad, interstate, compressor station, motorized watercraft, wind, etc.) of signals that have been recorded, and links this knowledge to the corresponding measured averaged noise levels. This would allow the contributions of specific and well-known noise sources to be quantified for the locations of interest, and understood by all parties, not just acoustic engineers. The instrumentation that has been used is certainly capable of recording this data, though the observer must keenly observe, take good field notes, and prepare the narrative. However, due to a narrowly-focused protocol, this was not done. Instead, the information provided represents averages of noise levels observed over extended time periods (typically an hour).

From: Doug Bonamici [mailto:dbonamici@critdoj.com]
Sent: Monday, March 10, 2014 2:36 PM
To: Yue, Aaron@DTSC
Cc: howard.magill@crit-nsn.gov; Wilene Fisher-Holt; Margaret R. Eggers; Nora McDowell; Dawn Hubbs; Edgar Castillo; Charlie Schlinger; Baker, Karen@DTSC
Subject: Comments on Noise/ Vibration and Pipeline Routing

Mr. Yue, the Colorado River Indian Tribes will not be submitting further comment for the 60% Design phase on the Noise and Vibration issues nor on the Pipeline Routing issues at this time. We have participated in the discussions of those issues, and are satisfied the DTSC, DOI and PG&E have heard our concerns directly, and through the other Tribal comments. We will consider adding further input as the design process moves forward.
Thank you for your efforts in this regard. db

Douglas F. Bonamici
Law Clerk, Office of the Attorney General
Colorado River Indian Tribes
26600 Mohave Rd.,
Parker, Arizona 85344
Phone: 928-669-1271
Email: doug.bonamici@crit-nsn.gov

Attachment I: RTC #384a/b

Parameters used to calculate the mixed convection ratio, M in FW-1/FW-2

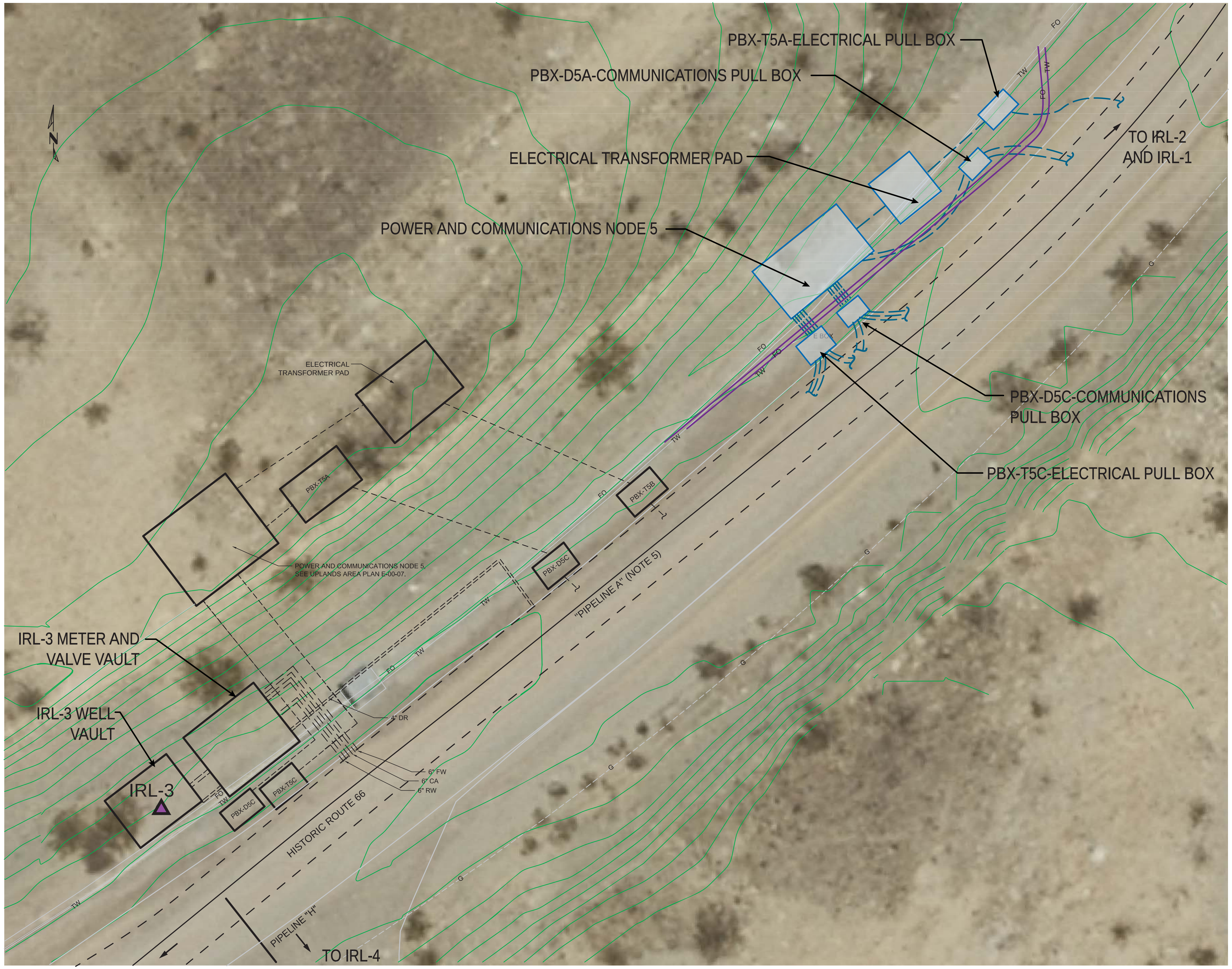
RTC #384a/b FMIT-94/Hualapai-80/Chemehuevi-80/Cocopah-80/CRIT-80
Parameters used to calculate the mixed convection ratio, M in FW-1/FW-2

FW-1		**M =**	**0.22**
r	740	Ft	Approximate distance from FW-1 to IRL wells
β	250	Ft	Aquifer thickness near FW-1
Q	19250	ft3/day	Nominal 100 gpm pumping rate for FW-1
Kv	0.75	ft/day	Average Kv from model - range is 0.5 to 1.0 ft/day near FW-1
ρ	996.18	g/L	Density of 450 ppm water at 85 deg F
ρ_0	1001.07	g/L	Density of 7,000 ppm water at 85 deg F - representative of deep zone water near FW-1

FW-2		**M=**	**0.35**
r	600	Ft	Approximate distance from FW-2 to TCS injection wells
β	60	Ft	Aquifer thickness near FW-2
Q	9625	ft3/day	Nominal 50 pumping rate for FW-2
Kv	1.5	ft/day	Default value in model for areas where no Kv measurements are available
ρ	996.18	g/L	Density of 450 ppm water at 85 deg F
ρ_0	1006.27	g/L	Density of 14,000 ppm water at 85 deg F - representative of deep zone water near FW-2

Attachment J: RTC #438, #440, #442

Changes to Infrastructure Locations for Node 5/FW-1, Visualizations for IRL-2



TO FW-1

IRL-3 WELL, METER AND VALVE VAULT SITE PLAN

0 5 10 15

LEGEND

- EXISTING UNDERGROUND LINE
- EXISTING ABOVEGROUND LINE
- EXISTING ABOVEGROUND LINE, RELOCATED
- EDGE OF ROAD (HISTORIC ROUTE 66)
- TOPOGRAPHIC CONTOUR LINES
- NEW UNDERGROUND LINE, INITIAL LOCATION
- NEW UNDERGROUND LINE, REVISED LOCATION
- NEW INJECTION WELL (IRL-3), INITIAL LOCATION
- NEW VAULT (FOOTPRINT DIMENSION INCLUDES FOOTING)
- NEW VAULT OR PULL BOX, REVISED LOCATION (FOOTPRINT DIMENSION INCLUDES FOOTING)

PBX PULL BOX

PIPELINE SERVICE

CA	CARBON AMENDED
FO	FIBER OPTIC
FW	FRESH WATER
G	GAS
RW	REMEDY PRODUCED WATER
TW	TREATED (FILTERED) REMEDY PRODUCED WATER

6" FW
PIPELINE SERVICE
PIPELINE SIZE (INCHES)

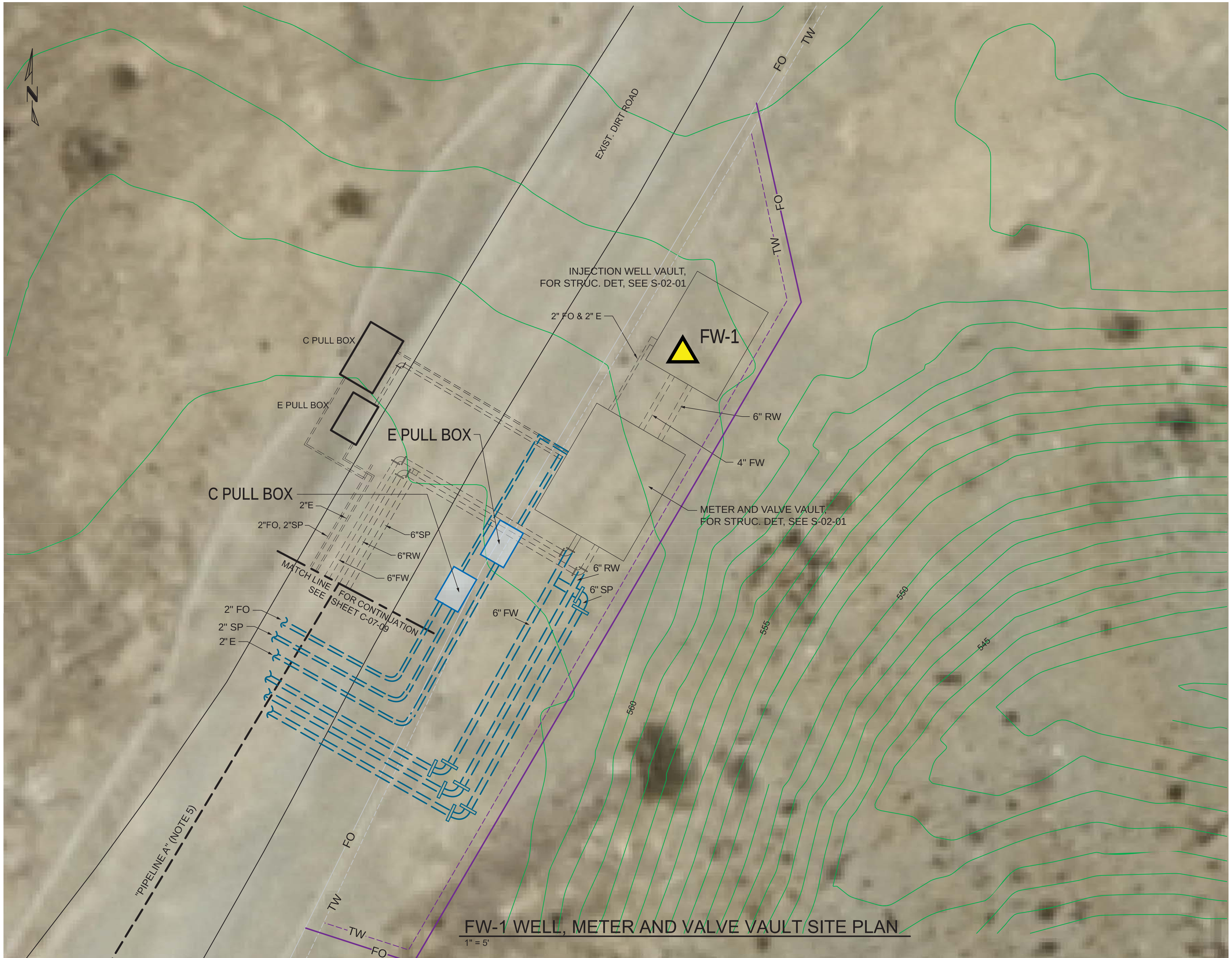
NOTES:

1. THIS IS A CONCEPTUAL LAYOUT AND IS NOT INTENDED AS AN ENGINEERING DESIGN.
2. FOR INJECTION WELL AND METER VAULT STRUCTURAL DETAILS, SEE DWGS. S-05-01 THROUGH S-05-05.
3. FOR WELL, METER AND VALVE VAULT MECHANICAL DETAILS, SEE DWGS. M-05-05 AND M-05-06.
4. SURVEILLANCE CAMERA LOCATION AND DETAILS TO BE DETERMINED LATER.
5. THIS REPRESENTS THE CENTERLINE OF THE PRE-CAST CONCRETE TRENCH SECTION WITH THE DASHED PARALLEL LINES SHOWING THE LATERAL EXTENT OF THE TRENCH.

Node 5/IRL-3: RTC to FMIT-130
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ES110813183449BAO_Topock_IRL-3.ai_120913_lho

CH2MHILL



0 5 10 15

LEGEND

- EXISTING UNDERGROUND LINE
- EXISTING ABOVE GROUND LINE
- EDGE OF ROAD
- EXISTING UNDERGROUND LINE, RELOCATED
- EXISTING ABOVE GROUND LINE, RELOCATED
- TOPOGRAPHIC CONTOUR LINES
- NEW UNDERGROUND LINE, INITIAL LOCATION
- NEW ABOVE GROUND LINE, INITIAL LOCATION
- NEW UNDERGROUND LINE, REVISED LOCATION
- NEW FRESHWATER INJECTION WELL (FW-1)
- NEW VAULT OR PULL BOX, INITIAL LOCATION (FOOTPRINT DIMENSION INCLUDES FOOTING)
- NEW VAULT OR PULL BOX, REVISED LOCATION (FOOTPRINT DIMENSION INCLUDES FOOTING)
- 90° ELBOW

PIPELINE SERVICE

C	COMMUNICATION
E	ELECTRICAL
FO	FIBER OPTIC
FW	FRESH WATER
RW	REMEDY PRODUCED WATER
TW	TREATED (FILTERED) REMEDY PRODUCED WATER
SP	SPARE

6" FW
PIPELINE SERVICE
PIPELINE SIZE (INCHES)

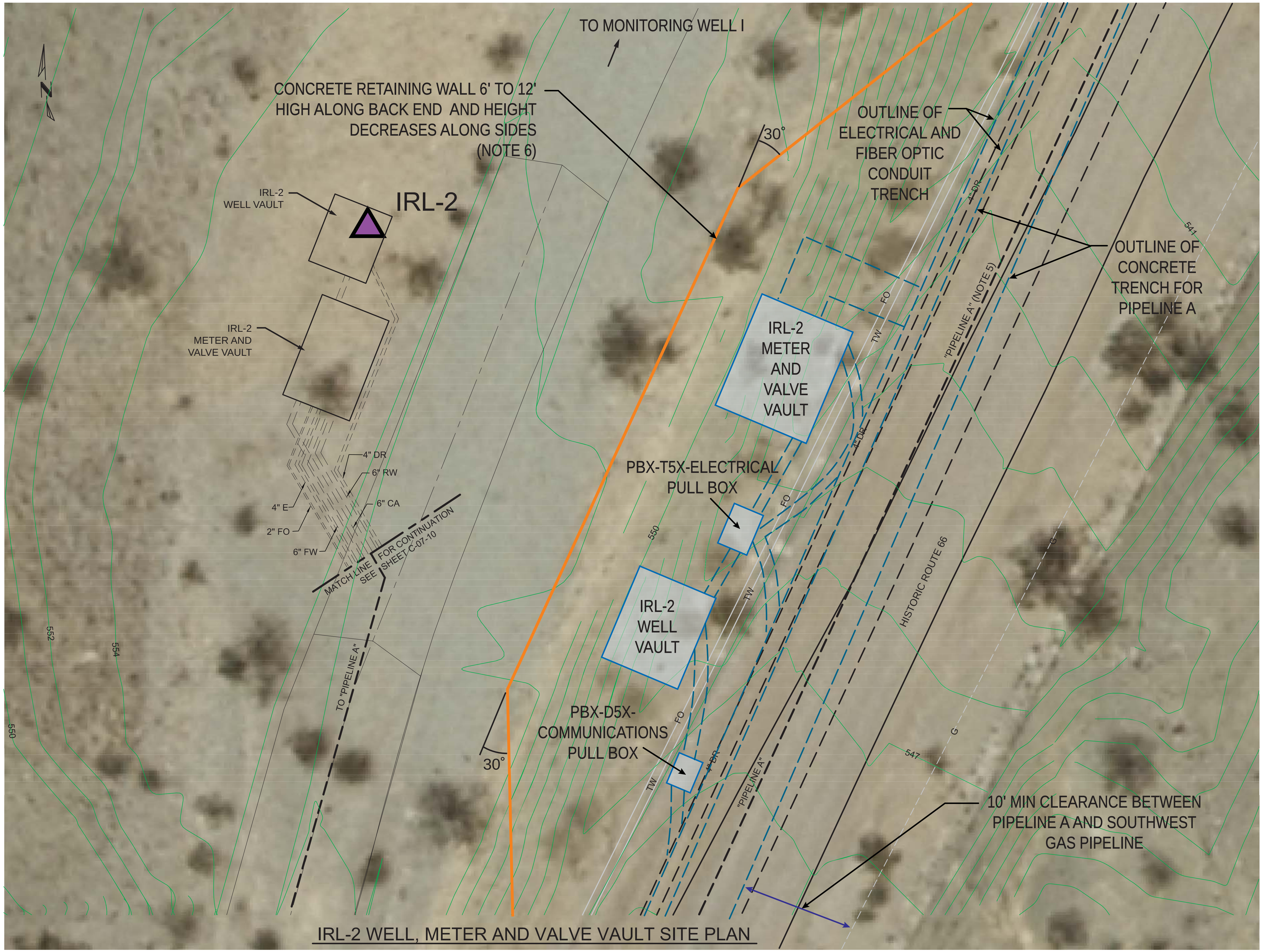
NOTES:

1. THIS IS A CONCEPTUAL LAYOUT AND IS NOT INTENDED AS AN ENGINEERING DESIGN.
2. FOR STANDARD PLANS OF WELL VAULT AND METER VAULT, SEE DWG S-02-01.
3. FOR MECHANICAL PLANS OF WELL VAULT AND METER VAULT, SEE DWG M-02-01.
4. FOR PLC PANEL, SEE DWG E-02-01.
5. THIS REPRESENTS THE CENTERLINE OF THE TRENCH SECTION. THE LATERAL EXTENT OF THE TRENCH IS NOT SHOWN, BUT IT IS APPROXIMATELY 5'6".

FW-1: RTC to FMIT-132
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

ES110813183449BAO_Topock_IRL-2.ai_121013_lho

CH2MHILL.



IRL-2 WELL, METER AND VALVE VAULT SITE PLAN

LEGEND

- EXISTING UNDERGROUND LINE
- EXISTING ABOVE GROUND LINE
- EDGE OF ROAD
- TOPOGRAPHIC CONTOUR LINES
- NEW UNDERGROUND LINE, INITIAL LOCATION
- NEW UNDERGROUND LINE, REVISED LOCATION
- NEW UNDERGROUND LINE TRENCH ALIGNMENT
- CONCRETE RETAINING WALL
- NEW INJECTION WELL (IRL-2), INITIAL LOCATION
- NEW VAULT, INITIAL LOCATION (FOOTPRINT DIMENSION INCLUDES FOOTING)
- NEW VAULT OR PULL BOX, REVISED LOCATION (FOOTPRINT DIMENSION INCLUDES FOOTING)

PBX PULL BOX

PIPELINE SERVICE

CA	CARBON AMENDED
DR	DRAIN
E	ELECTRICAL
FO	FIBER OPTIC
FW	FRESH WATER
G	GAS
RW	REMEDY PRODUCED WATER
TW	TREATED (FILTERED) REMEDY PRODUCED WATER

6" FW
PIPELINE SERVICE
PIPELINE SIZE (INCHES)

NOTES:

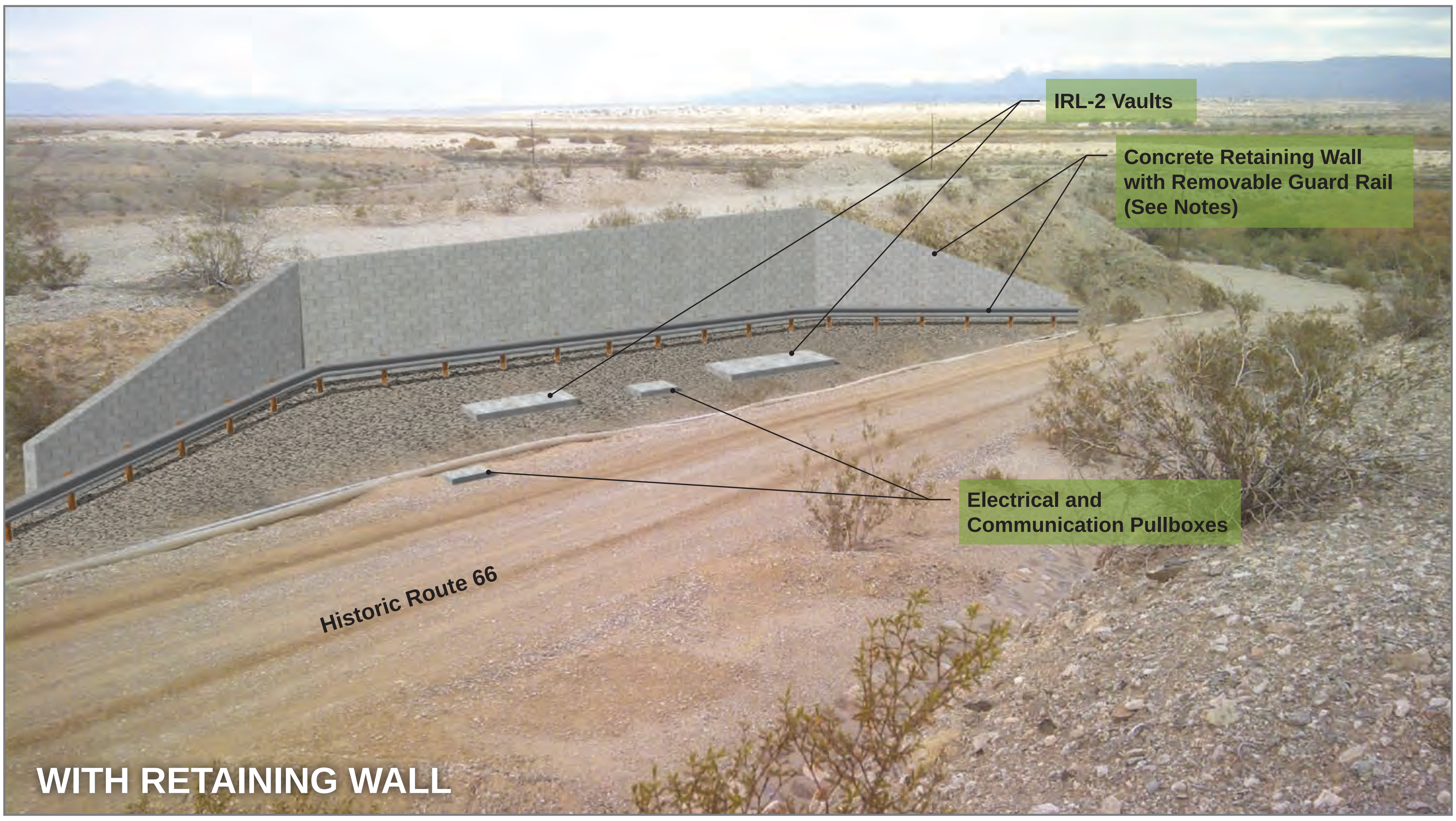
1. THIS IS A CONCEPTUAL LAYOUT AND IS NOT INTENDED AS AN ENGINEERING DESIGN.
2. FOR INJECTION WELL AND METER VAULT STRUCTURAL DETAILS, SEE DWGS. S-05-01 THROUGH S-05-05.
3. FOR WELL, METER AND VALVE VAULT MECHANICAL DETAILS, SEE DWGS. M-05-05 AND M-05-06.
4. SURVEILLANCE CAMERA LOCATION AND DETAILS TO BE DETERMINED LATER.
5. THIS REPRESENTS THE CENTERLINE OF THE PRE-CAST CONCRETE TRENCH SECTION WITH THE DASHED PARALLEL LINES SHOWING THE LATERAL EXTENT OF THE TRENCH.
6. THE CONCRETE RETAINING WALL WILL HAVE AN IMPACT PREVENTION SYSTEM (NOT SHOWN). THIS WILL CONSIST OF COMPONENTS LIKE K-RAIL, BOLLARDS OR GUARD RAILS. THESE WILL BE REMOVABLE FOR WELL AND EQUIPMENT MAINTENANCE.

0 5 10 15

IRL-2: RTC to FMIT-133
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

ES110813183449BAO_Topock_IRL-2.ai_120913_lho



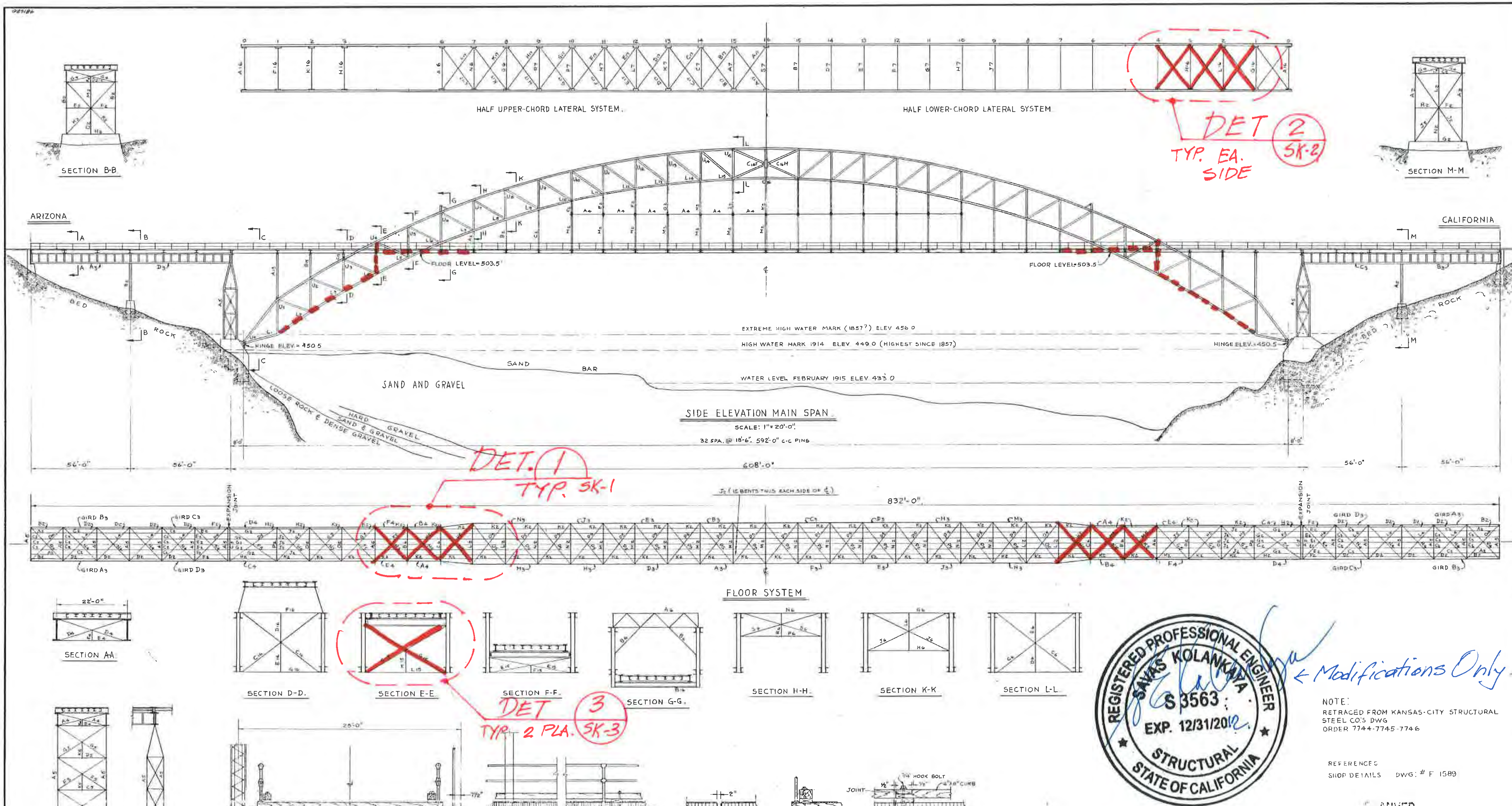
NOTES:

1. THIS IS A CONCEPTUAL VISUALIZATION FOR ILLUSTRATION PURPOSES ONLY AND IS NOT INTENDED AS AN ENGINEERING DESIGN.
2. IMAGE IS NORTH-FACING.
3. "PIPELINE A" IS BURIED UNDERGROUND AND RUNS IN HISTORIC ROUTE 66. "PIPELINE A" IS A PRE-CAST CONCRETE TRENCH WITH A LATERAL EXTENT OF APPROXIMATELY 4' 6" AND A DEPTH OF APPROXIMATELY 2'. ELECTRICAL AND COMMUNICATION LINES ARE LOCATED UNDERGROUND ADJACENT TO "PIPELINE A" (1' MINIMUM DISTANCE AWAY) WITH A LATERAL EXTENT OF APPROXIMATELY 2' AND DEPTH OF APPROXIMATELY 4'.
4. THE CONCRETE RETAINING WALL WILL BE APPROXIMATELY 6' TO 12' HIGH ALONG THE BACK AND THE HEIGHT WILL DECREASE ALONG THE SIDES.
5. THE CONCRETE RETAINING WALL WILL HAVE AN IMPACT PREVENTION SYSTEM. THIS WILL CONSIST OF COMPONENTS LIKE GUARD RAILS (AS SHOWN), K-RAIL OR BOLLARDS. THESE WILL BE REMOVABLE FOR WELL AND EQUIPMENT MAINTENANCE.

IRL-2 VISUALIZATION: RTC to FMIT-133
GROUNDWATER REMEDY PROJECT
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

Attachment K: RTC #68, #471

Recommended Modifications to Arched Bridge



NO	DATE	DESCRIPTION	APPRD
1	1/10/12	MOD'S	SK

TABLE OF CHANGES

APPROVED BY

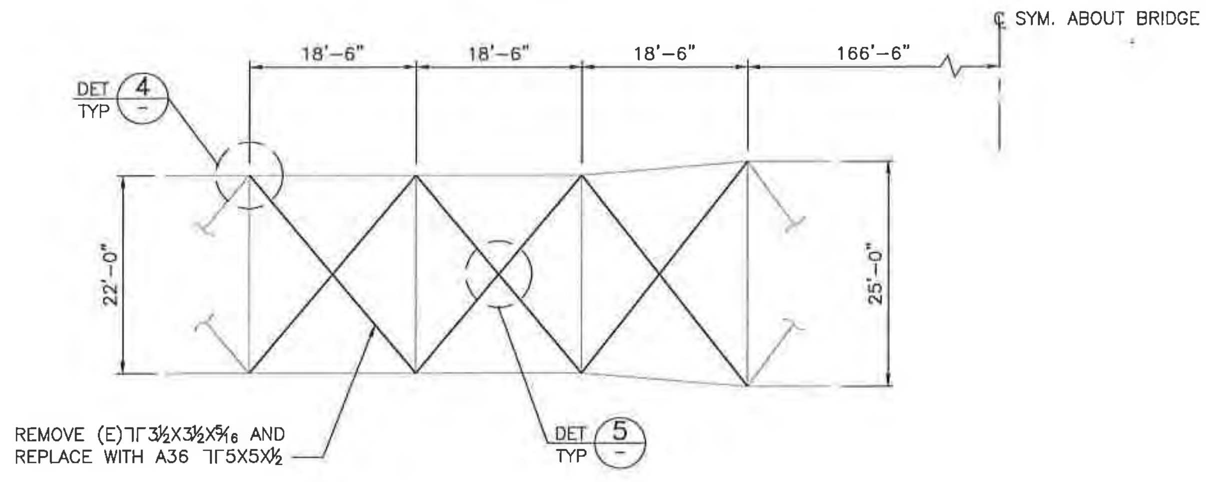
GM 101688
DRAWING LIST

BY Dept. of G.O.
DR. V. Peshkoff
CH. Flint
O.K.
DATE -6-50
SCALES As Shown

ERECTION PLAN
COLORADO RIVER HIGHWAY BRIDGE
TOPOCK-MILPITAS, MAIN 300

DEPARTMENT OF GAS OPERATION
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO CALIFORNIA

BILL OF MATERIAL
SUPERSEDES
SUPERSEDED BY
SHEET NO. SHEETS
DRAWING NUMBER 481620 CHANGE 1

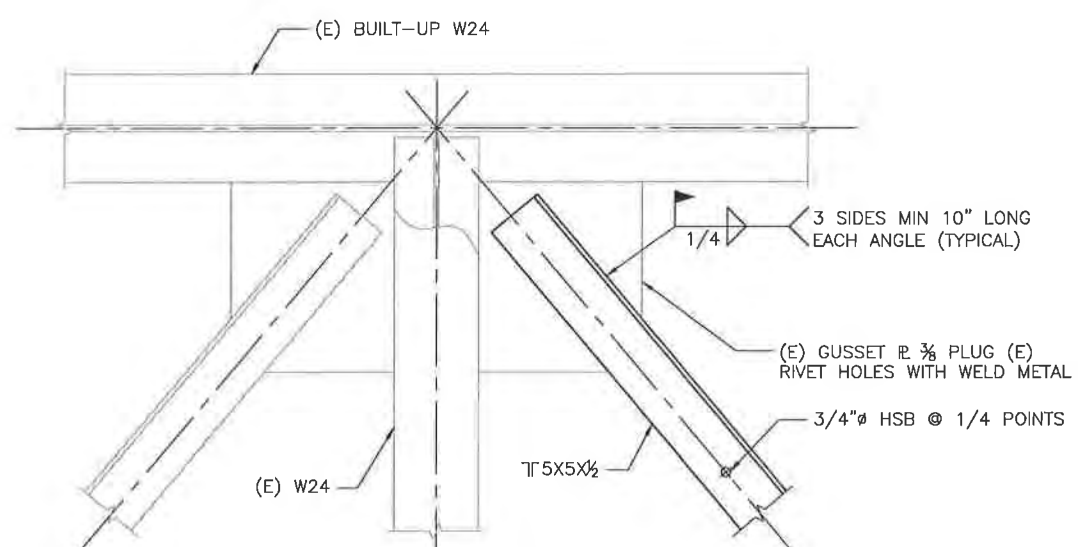


DETAIL 1 / 481620
SCALE: 3/32" = 1'–0"

NOTES

1. FOR LOCATION SEE DWG 481620.
2. CODES AND SPECIFICATIONS
   A. INTERNATIONAL BUILDING CODE IBC–2009.
   B. MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES, ASCE 7–05
   C. AISC MANUAL OF STEEL CONSTRUCTION, 13TH EDITION.
   D. AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, MARCH 9,2005 (ANSI/AISC 360–05)
   E. AISC SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS (ANSI/AISC 341)
   F. AWS D1.5, BRIDGE WELDING CODE – AMERICAN WELDING SOCIETY.
   G. AWS D1.8, STRUCTURAL WELDING CODE – SEISMIC SUPPLEMENT, AMERICAN WELDING SOCIETY.
   H. SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS, JUNE 30, 2004. HEREIN REFERRED TO AS THE RCSC SPECIFICATION.
   I. AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS, MARCH 18, 2005.
3. MATERIALS

   UNLESS OTHERWISE NOTED ON THE DESIGN DRAWINGS, MATERIALS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
   A. STRUCTURAL STEEL W–SHAPES ——— ASTM A992, Fy=50 ksi
   B. OTHER STRUCTURAL STEEL SHAPES, PLATES AND BARS ——— ASTM A36 , Fy=36 ksi
   C. STRUCTURAL STEEL TUBING ——— ASTM A500 GRADE B; Fy=46 ksi
   D. HIGH STRENGTH BOLTS, NUTS AND WASHERS ——— ASTM A325
   E. WELDING ELECTRODES ——— AWS A5.1 SERIES E70
4. PAINTING SHALL MATCH THE EXISTING STRUCTURE.
5. FIELD MEASURE AND VERIFY ALL DIMENSIONS AND CONDITIONS BEFORE FABRICATING STEEL.
6. FOR CONNECTION PROBLEMS REPORT TO THE ENGINEER FOR APPROVAL.



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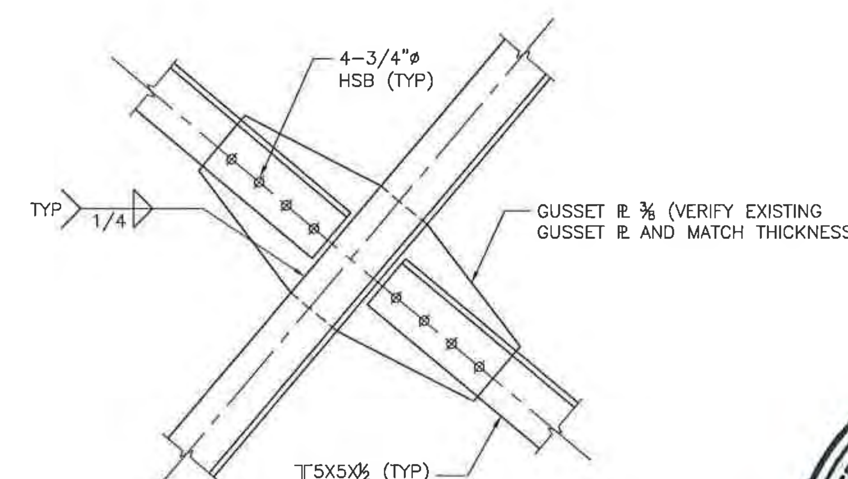

DETAIL 5
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AECOM
2101 WEBSTER STREET SUITE 1900
OAKLAND, CA 94612-3060

PROJECT NO.
60229232

REFERENCE DRAWINGS

NOTES

NO.	DATE	REVISION	DES	DWN	CHK	APPR
0	01/10/12	ISSUED FOR CONSTRUCTION	SK	KG	SK	

PROFESSIONAL SEAL

		DATE
SCALE:	AS NOTED	
DESIGNED BY	S. KOLANKAYA	1/10/12
DRAWN BY	K. GRAHAM	1/10/12
CHECKED BY	S. KOLANKAYA	1/10/12
APPROVED BY		
APPROVED BY		

STRUCTURAL DETAILS
HORIZONTAL DECK BRACES

TOPOCK L300–A ARCH BRIDGE

DWG NO. 481620 – SK1

REV 0

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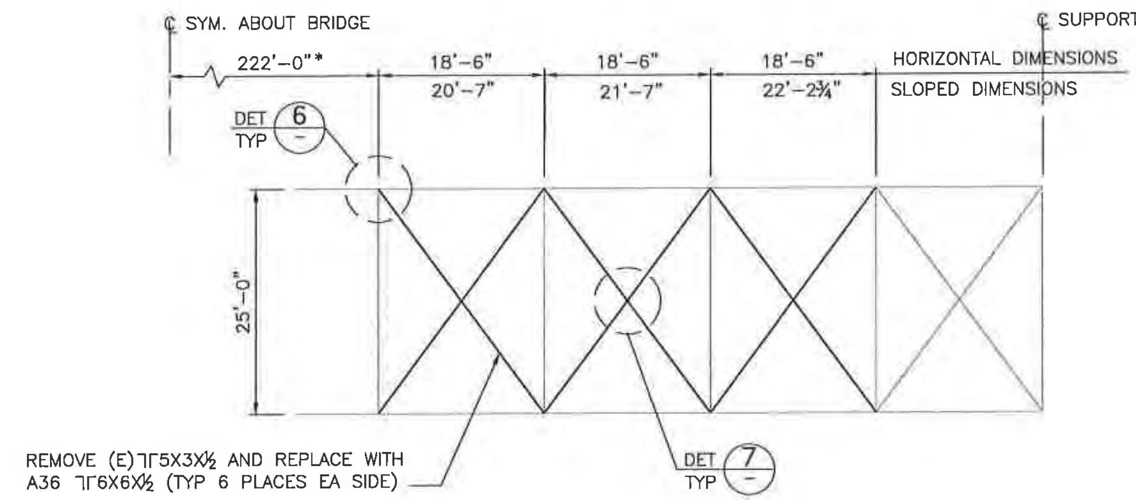
NOTES

1. FOR NOTES SEE DWG 481620 – SK1



DETAIL 2 481620
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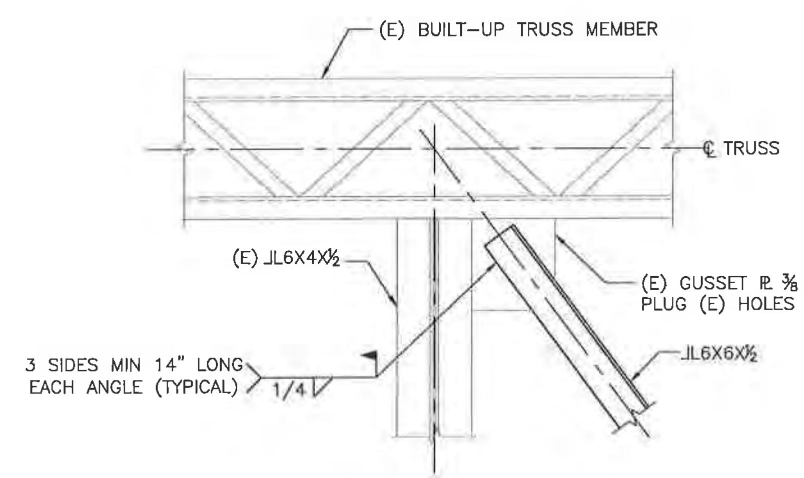

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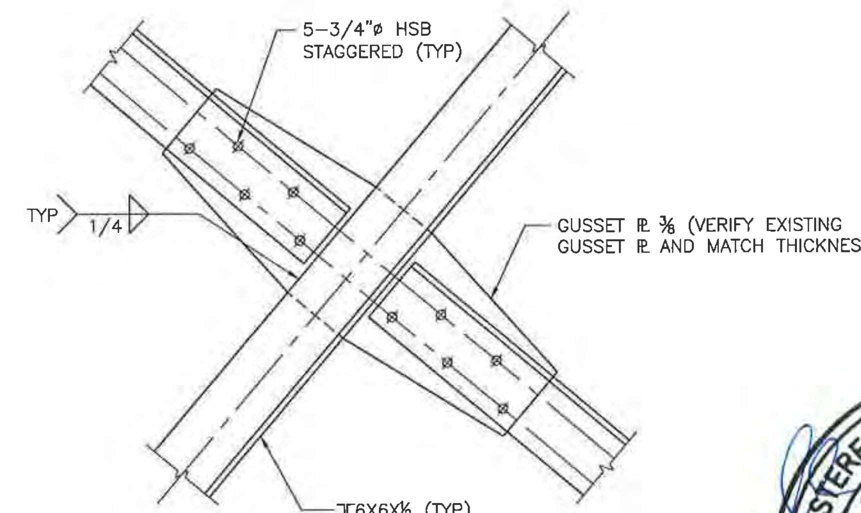

DETAIL 7 –
SCALE: 1 1/2" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
SAVAS KOLANKAYA
S 3563
EXP. 12/31/2012
STRUCTURAL
STATE OF CALIFORNIA

AECOM

2101 WEBSTER STREET SUITE 1900
OAKLAND, CA 94612-3060

PROJECT NO.
60229232

REFERENCE DRAWINGS

NOTES

NO.	DATE	REVISION	DES	DWN	CHK	APPR
0	01/10/12	ISSUED FOR CONSTRUCTION	SK	KG	SK	

PROFESSIONAL SEAL

		DATE
SCALE:	AS NOTED	
DESIGNED BY	S. KOLANKAYA	1/10/12
DRAWN BY	K. GRAHAM	1/10/12
CHECKED BY	S. KOLANKAYA	1/10/12
APPROVED BY		
APPROVED BY		

STRUCTURAL DETAILS
BOTTOM CHORD HORIZONTAL BRACES

TOPOCK L300–A ARCH BRIDGE

DWG NO. 481620 – SK2

REV 0

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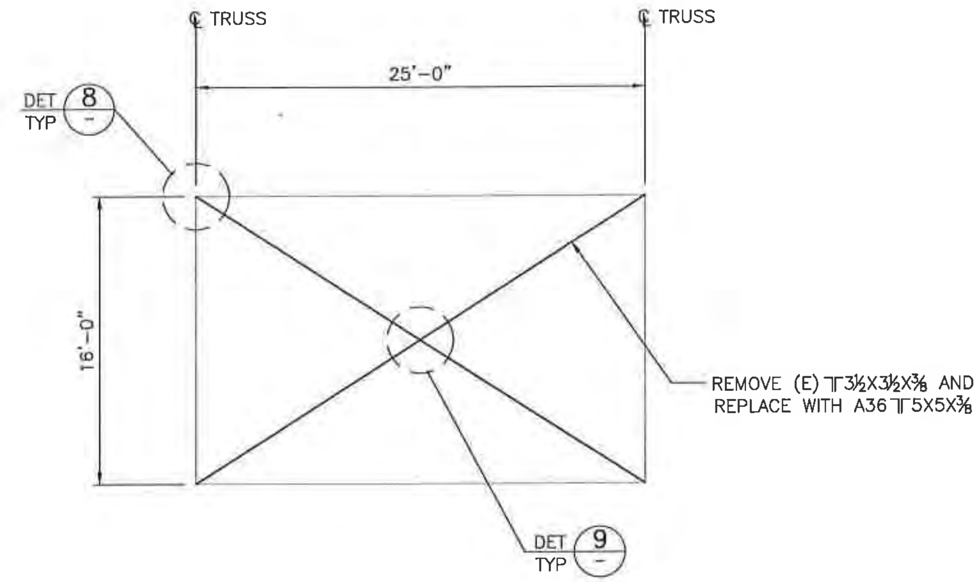
NOTES

1. FOR NOTES SEE DWG 481620 – SK1.



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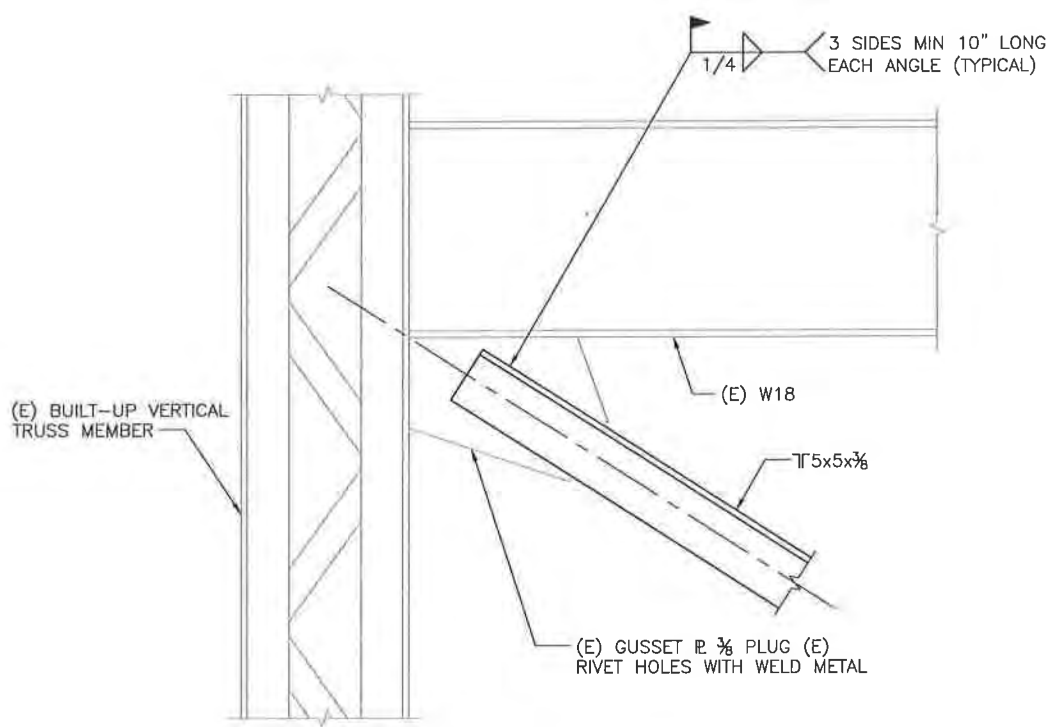

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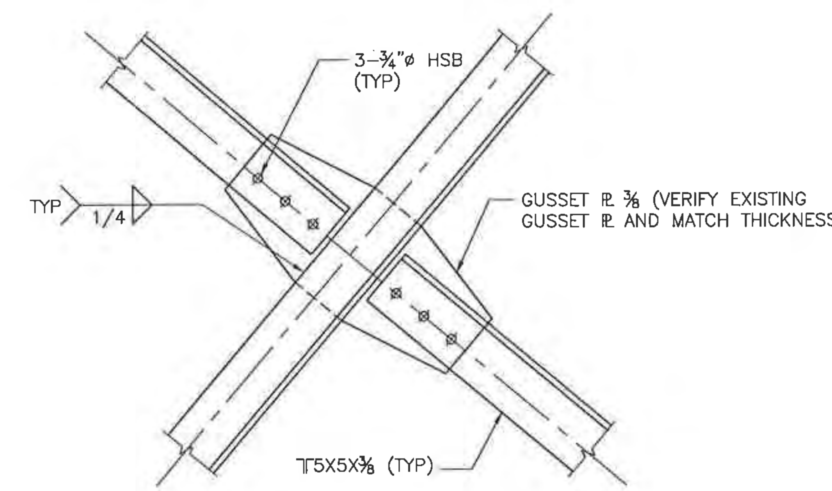

DETAIL 9
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AECOM
2101 WEBSTER STREET SUITE 1000
OAKLAND, CA 94612-3060

PROJECT NO.
60229232

–

REFERENCE DRAWINGS

NOTES

NO.	DATE	REVISION	DES	DWN	CHK	APPR
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PROFESSIONAL SEAL

		DATE
SCALE:	AS NOTED	
DESIGNED BY	S. KOLANKAYA	1/10/12
DRAWN BY	K. GRAHAM	1/10/12
CHECKED BY	S. KOLANKAYA	1/10/12
APPROVED BY		
APPROVED BY		

STRUCTURAL DETAILS
VERTICAL TRUSS BRACES @ 222'

TOPOCK L300–A ARCH BRIDGE

DWG NO. 481620 – SK3

REV 0

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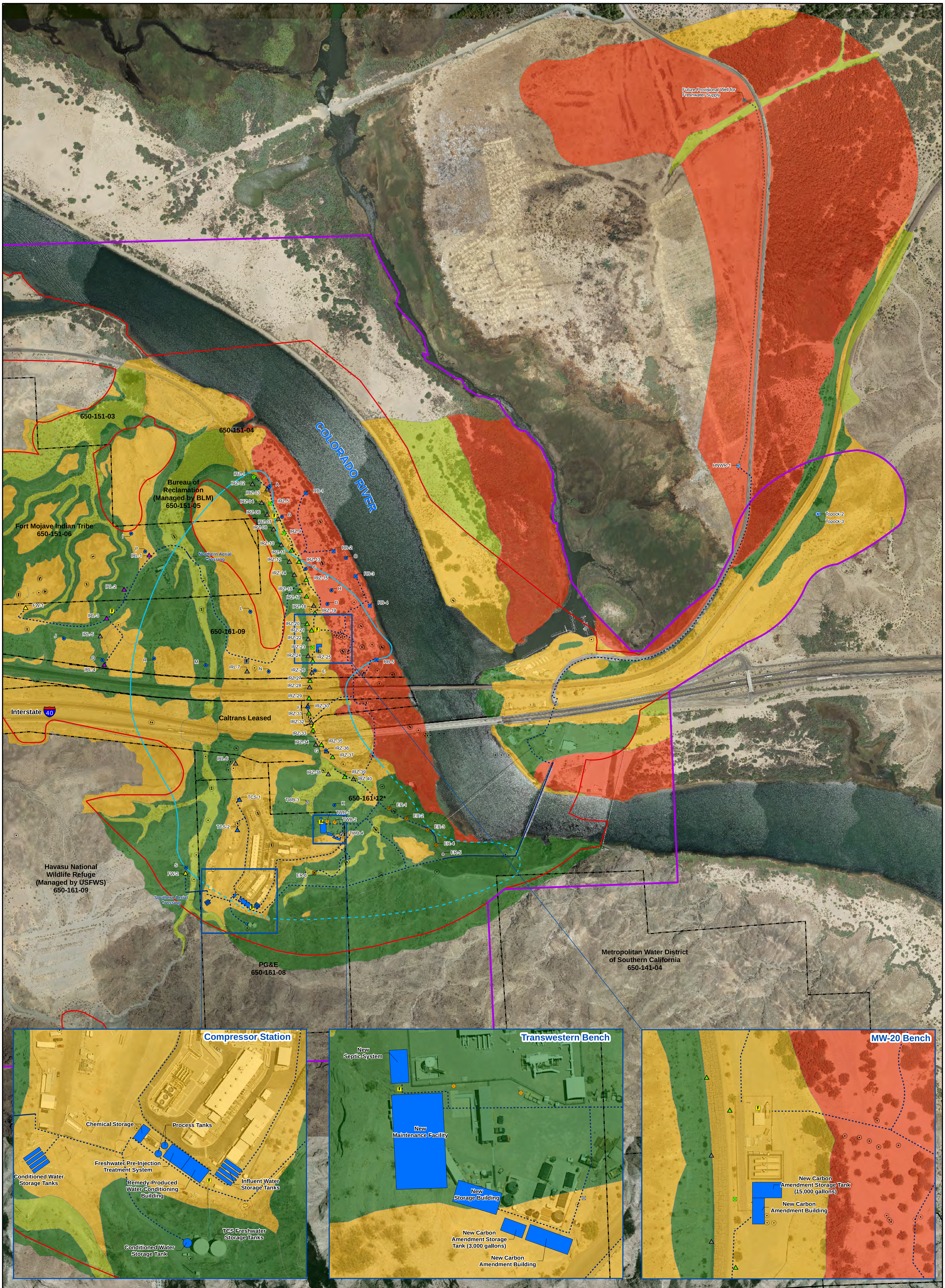
Attachment L: RTC #565

Geoarch Potential Layer and 60% Remedy Layout



LEGEND

- Existing Monitoring Well
- Existing Freshwater Supply Well
- Property Boundaries
- Area of Potential Effects (APE)
- EIR Project Area
- Approximate extent of hexavalent chromium [Cr(VI)] concentrations exceeding 32 micrograms per liter (µg/L) at any depth in groundwater based on fourth quarter 2011 sampling events. Dashed where based on limited data.

Remedy Wells

- Contingent Freshwater Source
- Freshwater Source
- Remedy Monitoring Well
- Extraction Well (East Ravine)
- Extraction Well (NTH IRZ)
- Extraction Well (Riverbank)
- Extraction Well (Transwestern Bench)
- Freshwater Injection Well
- Injection Well (Inner Recirculation Loop)
- Injection Well (NTH IRZ)
- Injection Well (Topock Compressor Station)
- Future Provisional Extraction Well
- Future Provisional Injection Well
- Future Provisional Electrical Transformer
- Proposed Electrical Transformer Location

Pipeline Corridor for Remedy

- Aboveground Pipe
- Underground Pipe/Conduit
- Future Provisional/Contingent Fresh Water Pipe

Remedy Facilities

- Proposed New Remedy Structure

GeoArch - Potential

- None
- Moderate
- Lower
- Higher

Note:
Note that in compliance with EIR mitigation measure CUL-1a-9, as well as PA and CHPMP mitigation measures, the pipeline along the dirt road west of National Trails Hwy is located in an existing, previously disturbed, access road. In addition, the location of the road and pipeline was field verified and does not create any direct physical impact or effect on the Topock Maze, as it is manifested archaeologically, in compliance with EIR mitigation measure CUL-1a-10, PA, and CHPMP mitigation measures.

N

0 300 600 1,200 Feet

FIGURE 3.0-1
GENERAL REMEDY SYSTEM LAYOUT

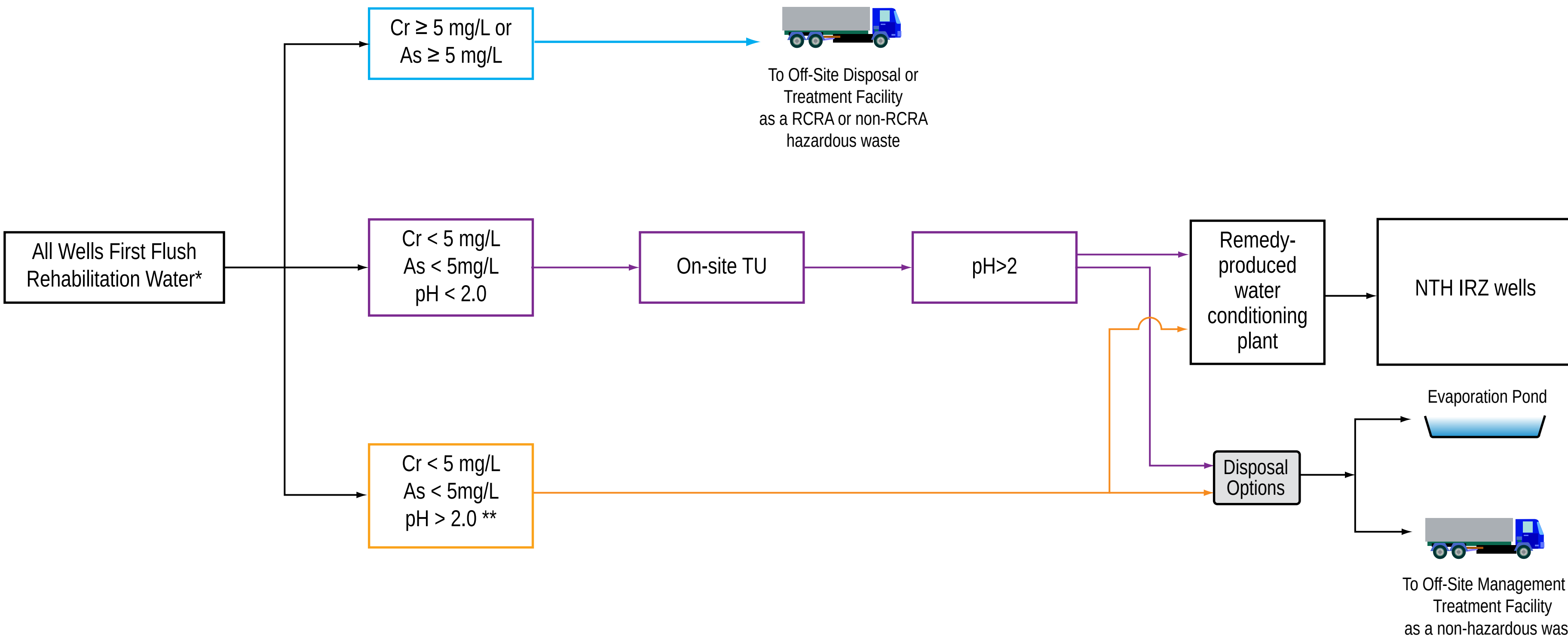
GROUNDWATER REMEDY BASIS OF DESIGN REPORT
INTERMEDIATE (60%) DESIGN
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL

Path: \\zinfandel\Proj\PacificGasElectricCo\TopockProgram\GIS\MapFiles\2013\EC_Working\GenRemLayout_GeoArch_Sensitivity.mxd

Attachment M: RTC #619

Revised Figure 6.1-2



LEGEND

Piping

Conveyed by truck

TU Treatment Unit permitted for (pH adjustment) hazardous waste treatment per California Code of Regulations Title 22. TU may be equipped with filters to remove solids.
Cr Chromium (dissolved)
As Arsenic (dissolved)
IRZ In-situ Reactive Zone
* Conveyance by trucking is backup option for IRZ and injection wells. For extraction wells, some trucking may be required.
** An optional approach to pH adjustment at the Remedy-Produced Water Conditioning Plant is to adjust it in the field with an On-Site TU
RCRA Resource Conservation and Recovery Act

Update – October 2013

FIGURE 6.1-2
REMEDY-PRODUCED WATER SCHEMATIC – FIRST FLUSH REHABILITATION
GROUNDWATER REMEDY IMPLEMENTATION –
OPERATIONS AND MAINTENANCE PLAN,
PG&E TOPOCK COMPRESSOR STATION,
NEEDLES, CALIFORNIA

CH2MHILL.

Attachment N: RTC #710

New COPCs Monitoring Table

DRAFT Table 2.1-X

Monitoring Program Wells and Surface Water Sampling Points for COPC Monitoring

Operations and Maintenance Manual Volume 2: Sampling and Analysis Plan

Revised Basis of Design Report/Intermediate (60%) Design Submittal for the Final Groundwater Remedy

PG&E Topock Compressor Station, Needles, California

Location ID	**Nitrate**	**Molyb-denum**	**Selen-ium**
Existing Monitoring Wells			
CW-02D		A	
CW-02M	As needed		
CW-03D		A	
CW-03M		A	
MW-10	A	A	
MW-12	A	A	A
MW-13	SA		
MW-14	Q[3]		
MW-20-070	M(yr), Q		
MW-20-100	M(yr), Q		
MW-20-130	A	A	A
MW-21			A
MW-22	A	A	A
MW-23-060	A	A	A
MW-23-080	A	A	A
MW-24A	A	A	A
MW-24B	A	A	A
MW-26	A	A	A
MW-27-020	Q		
MW-27-060	As needed		
MW-27-085	As needed		
MW-28-025	Q		
MW-28-090	A	A	A
MW-29	Q		
MW-30-030	Q		
MW-30-050	Q		
MW-32-020	As needed[2]		
MW-25	A	A	A
MW-32-035	A	A	A
MW-33-040	A	A	A
MW-33-090	A	A	A
MW-33-150	A	A	A
MW-33-210	Q		
MW-34-055	A	A	A
MW-34-080	A	A	A
MW-34-100	A	A	A
MW-35-060	A	A	A
MW-35-135	A	A	A
MW-36-020	As needed[2]		
MW-36-040	As needed[2]		
MW-36-050	As needed[2]		
MW-36-070	As needed[2]		
MW-36-090	Q		
MW-36-100	Q		
MW-37D	A	A	A
MW-37S	A	A	A
MW-38D		A	
MW-38S	A	A	
MW-39-040	As needed[2]		
MW-39-050	Q		
MW-39-060	Q		
MW-39-070	Q		
MW-39-080	Q		
MW-39-100	Q		
MW-41D	As needed		
MW-41M	Q		
MW-41S	Q		
MW-41S	A	A	A
MW-41M	A	A	A
MW-41D	A	A	A
MW-42-030	A	A	A
MW-42-055	As needed[2]		

A	Red font indicates newly added samples / wells
	Gray highlight indicates avg. concentraiton above threshold (10 mg/L for Nitrate, 70 mg/L for Molybdnemum, 50 mg/L for Selenium)
SA	Light gray font indicates wells monitored for nitrate under compliance or process control programs, at frequency indica

DRAFT Table 2.1-X
Monitoring Program Wells and Surface Water Sampling Points for COPC Monitoring
Operations and Maintenance Manual Volume 2: Sampling and Analysis Plan
Revised Basis of Design Report/Intermediate (60%) Design Submittal for the Final Groundwater Remedy
PG&E Topock Compressor Station, Needles, California

Location ID	Nitrate	Molyb-denum	Selen-ium
MW-42-065	As needed[2]		
MW-43-025	A	A	A
MW-43-075	As needed[2]		
MW-43-090	As needed[2]		
MW-44-070	A	A	A
MW-44-115	A	A	A
MW-44-125	A	A	A
MW-45-095	Q		
MW-46-175	A	A	A
MW-46-205	A	A	A
MW-47-055	M(yr), Q		
MW-47-115	M(yr), Q		
MW-49-135	Q		
MW-49-275	Q		
MW-49-365	As needed		
MW-50-200	A	A	A
MW-51	A	A	A
MW-52D	As needed[2]		
MW-52M	As needed[2]		
MW-52S	As needed[2]		
MW-53D	As needed[2]		
MW-53M	As needed[2]		
MW-53S	As needed[2]		
MW-54-085	As needed	A	
MW-54-140	As needed	A	
MW-54-195	As needed	A	
MW-55-045	As needed		
MW-55-120	As needed		
MW-56D	As needed		
MW-56M	As needed		
MW-56S	As needed		
MW-57-070		A	
MW-57-185		A	
MW-58-BR		A	
MW-59-100		A	
MW-60-125		A	
MW-61-110		A	
MW-62-065		A	
MW-62-110		A	
MW-62-190		A	
MW-63-065		A	
MW-64-BR		A	
MW-65-160		A	
MW-65-225		A	
MW-66-165	A	A	A
MW-66-230	A	A	
MW-67-185	A	A	A
MW-67-225	A	A	A
MW-67-260	A	A	
MW-68-180	A	A	
MW-68-240		A	
MW-69-195	A	A	
MW-70-105		A	
MW-71-35	A	A	
MW-72-80		A	
MW-73-80		A	
MW-74-240		A	
OW-02S		A	
PT-5D	Q		
PT-5M	Q		
PT-5S	As needed		
PT-9D	A	A	A
PT-9M	A	A	A

DRAFT Table 2.1-X
Monitoring Program Wells and Surface Water Sampling Points for COPC Monitoring
Operations and Maintenance Manual Volume 2: Sampling and Analysis Plan
Revised Basis of Design Report/Intermediate (60%) Design Submittal for the Final Groundwater Remedy
PG&E Topock Compressor Station, Needles, California

Location ID	**Nitrate**	**Molyb-denum**	**Selen-ium**
PT-9S	A	A	A
TW-1	A		A
Proposed monitoring Wells			
C	As needed[2]		
D	As needed[2]		
E	As needed[2]		
F	As needed[2]		
G	A	A	A

Attachment O: RTC #728

PG&E's Response to TRC Technical Memorandum on Chemistry

Response to Memo from Win Wright titled "RTC728_Memorandum_Nov18_2013_with comments_rev" (12/9/2013)

Comment 1 - For the Topock project, many of the groundwater samples will contain concentrations of ethanol or reaction products from the IRZ operations, and these samples will be inherently unstable.

Response – *As discussed below, PG&E believes that once preserved, stability is assured and approved method holding times apply.*

Comment 2 - Two graphs plotted by the commenter showing data from the Upland In-Situ Pilot Test (ISPT) report. During the ISPT ethanol-injection experiment, samples from monitoring wells were collected for analysis in the field (which were analyzed within 24 hours at the IM-3 facility laboratory), and samples were collected for analysis in the laboratory, where the holding time for Cr(VI) analysis was 28 days (per PG&E Holding Time Tech Memo, January 4, 2008, also attached).

Response - *PG&E believes that the basic construction of these plots is based on a questionable premise. The inherent assumption in these plots is that screening level field data quality are equal and comparable to laboratory data quality. Screening field data cannot reasonably be compared to fixed laboratory data quality and therefore, the conclusions of the table are somewhat suspect.*

Based on PG&E's experience with sampling chromium at Topock and Hinkley, any Cr(VI) present in the samples at the time of collection would be detected in the Cr(T) results, even if there were reaction in the sample bottle during transport or storage. In addition, in virtually all cases the Cr in the Cr(T) and Cr(VI) sample containers are approximately equal [Cr(T) ≅ Cr(VI)] (please note that there are specific conditions where this may not be true, see bottom of response to comment 3 below). Data at both the Topock and Hinkley project sites particularly demonstrate this connection at chromium concentrations that exceed 10 µg/l.

A graphic comparison of the laboratory Cr(T) results to laboratory Cr(VI) results yields better agreement in the range of 10-1000 µg/l (Figure 1, attached), than the graphs presented by the commenter using field Cr(VI) data to compare against laboratory Cr(VI) data. Below 10 µg/l, there is more scatter in the Cr(T) versus Cr(VI) results.

Comment 3 - Exhibit RTC-728a: Water from monitoring wells that showed TOC (ethanol) breakthrough, results plotting to the right of the 1:1 Line indicate that many of the field-analyzed Cr(VI) results were greater than the laboratory Cr(VI) results. Some samples showed positive results in the field, but showed below-detection results in the laboratory. An ideal scenario would be for all of the samples to fall on the 1:1 line.

Response - *A review of the Topock and Hinkley in situ data set yields the following observations with respect to the possibility of continued reduction of Cr(VI) to Cr(III) in the sample bottle after sample collection:*

- *For the Topock Upland ISPT, 443 samples were collected and analyzed for both Cr(T) and Cr(VI); 41 (9.3%) have results where the Cr(T) and the Cr(VI) are different by more than 10 µg/l and have a RPD that is greater than 20%. Of the 41 samples, six (1.4% of the 433 samples) have Cr(VI) results that are greater than Cr(T) results (i.e., reduction not possible) and 35 (7.9% of the 433 samples)* *have Cr(VI) results that are lower than the Cr(T) results. Therefore, assuming the difference between Cr(T) and Cr(VI) will vary equally for both analytes (based on the expected precision and accuracy levels of these methods), approximately 6.5% of the sample results could indicate a possibility of continued reduction in the sample bottle.*

In addition, there was no correlation between samples with an RPD greater than 20% and a difference of 10 µg/l or greater and the presence of TOC. Only 15 samples (3.3% of the 433 samples) were associated with TOC that exceeded 50 mg/L and met the conditions necessary for continued reduction to have occurred [i.e., Cr(VI) results that are lower than the Cr(T) results, RPD greater than 20%, and a difference greater than 10 µg/l] (further explanation of these conditions is provided below). For the 24 samples with TOC concentrations that exceeded 1000 mg/l, the results showed no indication the samples continued to be reduced after sample collection and preservation.

- *For the Hinkley IRZ project, of the 8684 samples that have both Cr(T) and Cr(VI) results, 433 (5%) have results where the Cr(T) and the Cr(VI) are different by more than 10 µg/l and have a RPD that is greater than 20% . Of the 433 samples, 154 (1.8% of the 8684 samples) have Cr(VI) results that are greater than the Cr(T) results (i.e., reduction not possible), and 279 (3.2% of the 8684 samples) have Cr(VI) results that are lower than the Cr(T) results. Assuming the difference between Cr and Cr(VI) will vary equally for both analytes (based on the expected precision and accuracy levels of these methods), approximately 1.4% of the samples have results that could indicate possible continued reduction in the sample bottle.*

- *In summary, with over 9,000 sample results between the Topock and Hinkley in-situ projects, less than 2% show a possibility that continued reduction could occur in the sample container after sample collection and preservation.*

The following are considered the only conditions where Cr(VI) can possibly be reduced in a sample bottle after collection and preservation:

- ***Cr(VI)<Cr(T)*** *– If Cr(VI) is greater than Cr(T), reduction is not possible in the sample bottle during transport or storage.*

- ***RPD>20% -*** *Because the Cr(T) and Cr(VI) analyses are performed by different methods and use different instruments, a relative percent difference (RPD) of 20% or more is possible based on the expected precision and accuracy levels of these methods.*

- ***Difference between Cr(VI) and Cr(T)>10 µg/l -*** *Sample results that differ by less than 10 µg/l (for low concentration samples) could be caused by naturally occurring "dissolved" chromium, whether colloidal or trivalent. Such difference could also be caused if the rate of Cr(III) precipitation is lower than the rate of Cr(VI) reduction in the aquifer.*

Comment 4 - Exhibit RTC-728b: Even at low TOC breakthrough concentrations (146 mg/L), the field Cr(VI) results are 20-30% greater than the laboratory Cr(VI) results. These discrepancies could be inherent in the different methods, or could be caused by turbid field samples or high iron concentrations which interfere with the field colorimetric method. However, these discrepancies also could be caused by conversion of Cr(VI) to Cr(III) within the sample bottle during the 28-day holding time; hence, the laboratory Cr(VI) results were lower than the field Cr(VI) results.

Response - *See response to comment 2 for comparison of laboratory and field screening data. PG&E agrees with the possible causes of discrepancies identified in the comment, i.e., inherent in the* *different methods, or could be caused by turbid field samples or high iron concentrations which interfere with the field colorimetric method. PG&E believes that these are also reasons why the data cannot be compared to one another.*

PG&E does not agree with the statement regarding the conversion of Cr(VI) to Cr(III) in a preserved sample regardless of holding time. Both chemical and biological reactions are severely slowed or stopped due to the decrease in temperature (samples are around 27 °C when they come out of the wells and are cooled to 4°C as soon as possible). In addition, after the buffer solution is added to the samples, pH (pH 9.3 - 9.7) also severely slows or stops all chemical and biological reactions.

Furthermore, the data collected at PT-9S (the location with a TOC breakthrough of 146 mg/L, as noted in the comment) do not indicate a relationship between the arrival of TOC with discrepancies between field and laboratory concentrations of Cr(VI). Results for laboratory and field measured Cr(IV), Cr(T), and TOC over time are plotted in Figure 2. A discrepancy was measured in the first, baseline sample collected, prior to introduction of TOC into the aquifer, and discrepancies also occurred in other samples collected before the TOC arrived on November 12, 2008. Following TOC arrival, the discrepancies do not correlate with the presence of TOC. Cr(T) and laboratory Cr(VI) concentrations were in better agreement than laboratory and field Cr(VI) throughout the dataset, reinforcing that the laboratory Cr(VI) concentrations are indicative of aquifer conditions.

It should also be noted that samples should always be analyzed as soon as possible after collection. The holding time listed by the method is a maximum time that samples may be held before the start of analysis and still be considered valid without being qualified. Although a maximum holding time of 28 days was established for Cr(VI), the average holding time over the last 4 years has been 8 days for the groundwater monitoring samples and under four days for the IM3 facility samples; analyzed by the off-site laboratory.

Comment 5 - Attached is a press release from the California Dept. of Public Health, where the holding time of 5 days is recommended for Cr(VI) analyses by EPA 218.6 (ion chromatography with post-column derivatization).

Response - T*he press release refers to recommendations regarding drinking water. Topock groundwater samples are collected for environmental data analysis, not drinking water analysis. The PG&E holding time study was performed over two sampling events covering 60 samples collected from randomly selected Topock wells with Cr(VI) concentrations ranging from 0.2 µg/L to 14,800 µg/L. The study results strongly support longer holding times (and follows the EPA Final Methods Update Rule published May 18, 2012).*

With regard to the use of the borate buffer solution referenced in the press release, the buffer was intended to be used as a way to make sure the desired pH range of the sample was obtained. The current buffer PG&E uses is approved by EPA and DTSC, and is mandated by the Water Board on the Hinkley project. There has been no issue with obtaining the desired pH. PG&E believes that changing buffer is not needed at Topock and is not required by the EPA method.

Recommendations:

1) Holding time of 5 days for analysis of Cr(VI) by EPA method 218.6 (or alternatively EPA 218.7). Field filtration and preservation with borate-carbonate buffer.
2) Holding time of 24 hours for SM-3500 Cr-B. Field filtration, and preservation with a basic solution (sodium hydroxide, or alternatively ammonium sulfate/ammonium hydroxide buffer). Since chlorine may be used as post-treatment for water from HNWR-1, the ammonium sulfate will help remove chlorine.

3) Holding time of 24 hours for the Hach hexavalent chromium method. Field filtration, no preservation.
4) Revisit and update the PG&E Holding Time Study, where different preservatives, holding times, TOC spike samples, and Cr(VI) spike samples can be compared.
5) Sample splits--continue to analyze for field Cr(VI) and laboratory Cr(VI). Splits should comprise 10% of all monitoring well samples collected as part of the groundwater remedy, until confidence can be proven that preservation methods and holding times are providing the best data regarding Cr(VI) results.

Response to Recommendations:

1) *Disagree. The five day holding time and the borate-carbonate buffer are recommendations from the State for drinking water analysis and were not intended for environmental analysis. It is more appropriate to use the May 2012 EPA Update Ruling which specifies the buffer and holding time criteria for CrVI) in environmental analysis. No changes are proposed to the 28 days holding time.*
2) *Disagree. The May 2012 EPA Update Ruling specifies the buffer and holding time criteria for Cr(VI) in environmental analysis and does not apply for just the EPA 218.6 method. Note method SM-3500 Cr-B is only used for samples when concentrations are expected to be greater than 100 µg/L. The standard ammonium sulfate/ammonium hydroxide buffer was showed to work for this method as well. No changes are proposed to the 28 days holding time.*
3) *Agree. The field laboratory protocols follow the 24 hour holding time, the field filtration, and the use of no preservative.*
4) *Disagree. PG&E does not believe that the additional holding time studies are needed or warranted because the current holding time follows the EPA Final Methods Update Rule published May 18, 2012. Furthermore, producing a carbon spike that would mimic the field conditions would be very difficult or impossible.*
5) *Disagree. See response to comment 2. Note that field screening data are intended as screening level data of process control purposes only and are not intended to replace laboratory data.*

Figure 1. Laboratory Measured Cr(VI) versus Cr(T) Concentrations
Uplands Pilot Study Data July 2007-July 2013
Wells with TOC arrival (PT-7S, PT-7M, PT-7D, PT-8S, PT-8M MW-24A, PT-9S)

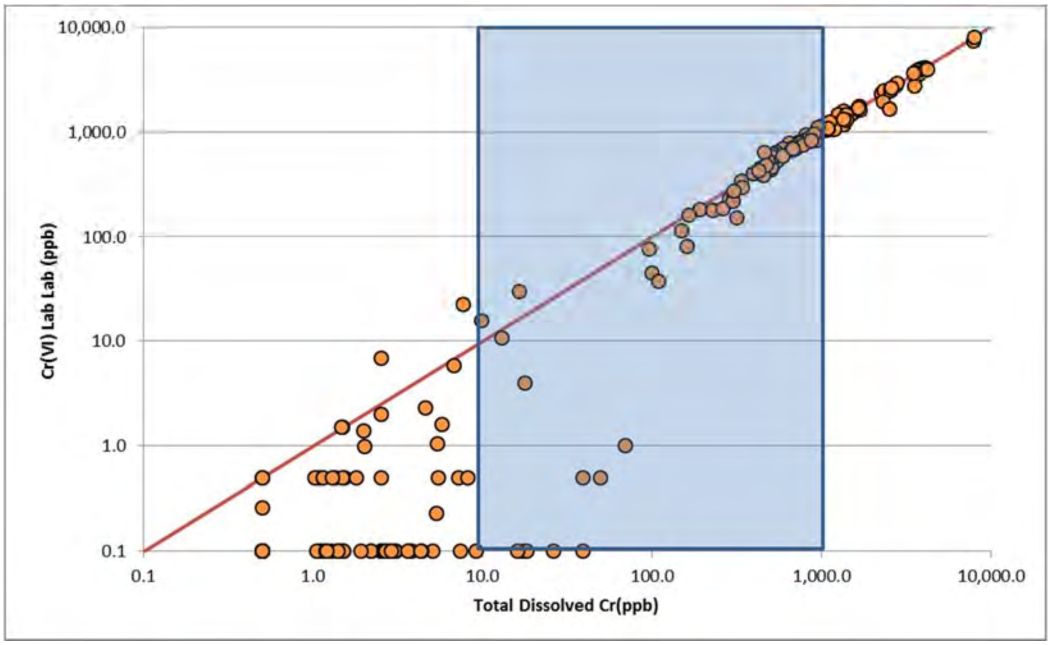
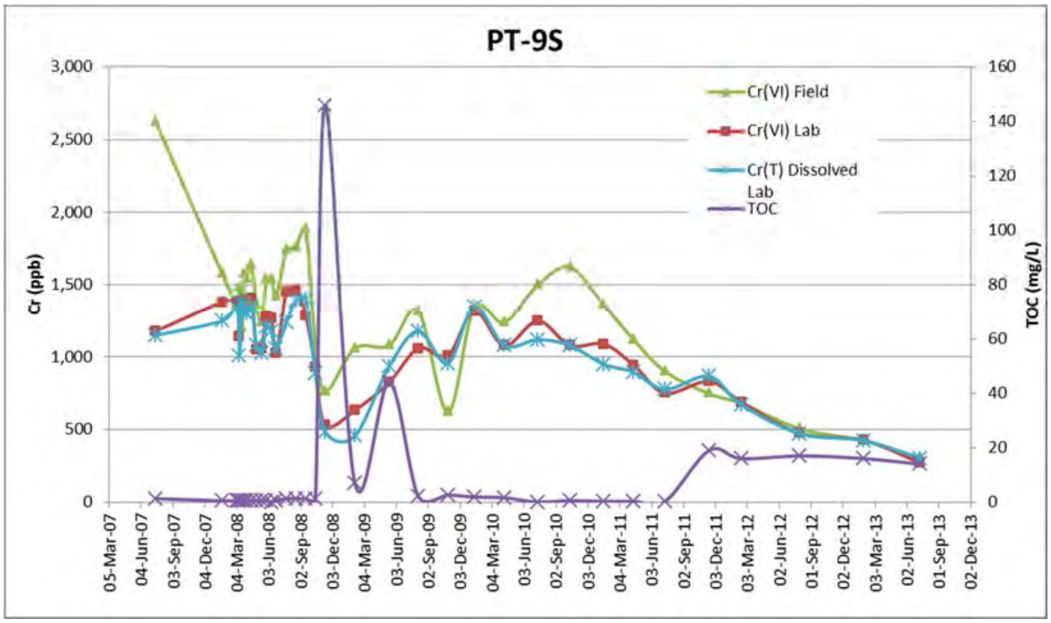


Figure 2. PT-9S Concentration Trends, July 2007-July 2013



Attachment P: RTC #181

Hinkley IRZ Well Fouling

PG&E Topock Compressor Station, Needles, CA
Summary of IRZ Well Fouling at Hinkley as it Relates to Re-Injection of Remedy Produced Water into IRZ Injection Wells at Topock
1/27/2014

One option for reuse of remedy produced water at the PG&E Topock Compressor Station site is to condition and re-inject into National Trails Highway (NTH) In Situ Reactive Zone (IRZ) injection wells. This summary presents information on the factors affecting IRZ injection well fouling based on experience at the PG&E Hinkley Compressor Station site; and an evaluation of the potential for re-injection of conditioned remedy produced water to affect IRZ injection well performance at Topock. Experience with IRZ well fouling at Hinkley has been incorporated into the remedy design for Topock. Operational information collected to date at Hinkley continues to support the design criteria for the remedy produced water conditioning system proposed in the 60% design.

Summary of IRZ Well Fouling at Hinkley
IRZ injection well fouling occurs as the result of the generation of biomass and/or formation of mineral precipitates caused by organic carbon injections. Two primary types of fouling have been observed in the Hinkley IRZ injection wells:

- Microbial biomass and associated extracellular polysaccharides.
- Mineral precipitates. These are comprised primarily of reduced iron sulfide minerals formed through the generation of ferrous iron from iron reduction and sulfide from sulfate reduction. In addition to these types of precipitates, carbonate minerals may also form within IRZ injection wells as carbonate is generated by microbial respiration.

IRZ well fouling is currently managed at Hinkley by chemical rehabilitation, typically with phosphoric acid (NuWell 120) and a biodispersant (NuWell 310). Water extracted from injection wells during rehabilitation is filtered for solids removal and blended with recirculated groundwater for re-injection.

Evaluation of Potential for Remedy Produced Water to Foul IRZ Injection Wells Conducted as Part of the Remedy Design
As indicated in Table F-1 in Appendix F of the 60% Basis of Design, the majority of remedy produced water is anticipated to be similar in water quality to the water from the Arizona aquifer or to the water from the aquifer at the NTH IRZ and Riverbank remedial wells, and may potentially contain sediment, IRZ byproducts, and rehabilitation chemicals. As discussed in the 60% Basis of Design, two parameters were considered important for the re-injection of remedy produced water into IRZ injection wells in order to minimize potential fouling based on this profile, and were included in the design specifications for the conditioning plant (Exhibit 3.4-5 on the 60% Basis of Design):

- **pH** - As stated in the design, the pH of the conditioned water will only be adjusted if it falls outside a neutral range (specifically a range of 6.5 to 8.5). The range was selected to match closely with the natural pH of the groundwater in the NTH IRZ and is prescribed to minimize adverse geochemical reactions that might increase the precipitation of minerals.

- **Sediment**- Solids will be removed from the remedy produced water to minimize IRZ injection well clogging, with a design specification of total suspended solids (TSS) less than 5 microns.

Other potential constituents in the remedy produced water were evaluated as part of the remedy design but not considered likely to have a significant effect on well fouling. Therefore, design criteria were not specified for constituents/parameters other than pH and sediment measured as TSS. Other constituents reviewed included the following:

- **IRZ Byproducts:** Elevated concentrations of IRZ byproducts, such as dissolved iron and dissolved manganese, are expected to remain soluble in the reducing environment of the IRZ and are not expected to have a significant effect on fouling.

- **Rehabilitation Chemicals:** The chemical rehabilitation process at Topock will employ similar techniques as have been used at Hinkley, including the use of commercially available well rehabilitation products that are designed for drinking water well rehabilitation and remediation well rehabilitation. Based on experience at Hinkley, management of water generated during well rehabilitation through solids removal, blending with re-circulated groundwater and re-injection does not exacerbate fouling.

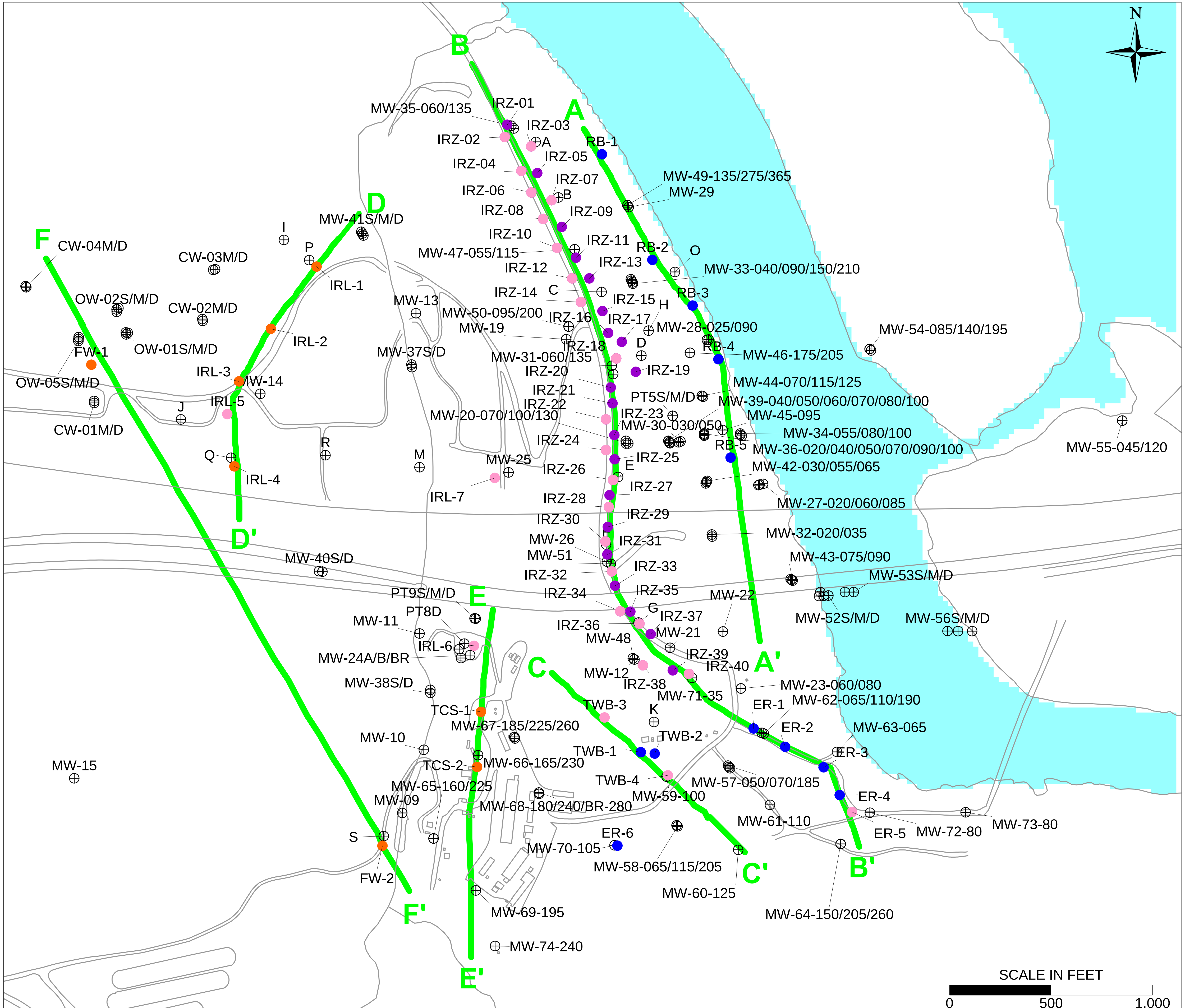
- **Total Dissolved Solids:** Total dissolved solids is comprised of cations, anions, alkalinity, and dissolved metals. Several of these ions (e.g. calcium, magnesium, bicarbonate/carbonate, and sulfate) could potentially precipitate as carbonate or gypsum minerals causing fouling. Others (e.g., sodium, potassium, chloride) are highly soluble and not anticipated to cause precipitation or fouling, even if added as sodium hydroxide or hydrochloric acid for conditioning. The potential for fouling of carbonate or gypsum was considered minimal, particularly in comparison with fouling due to iron sulfide minerals and biomass generated by the IRZ, based on the following:

    - Concentrations of calcium, magnesium, and carbonate in the remedy produced water are anticipated to be lower or comparable to the aquifer in the vicinity of the NTH IRZ injection wells, limiting the potential for precipitation of carbonates and gypsum from mixing.

    - Gypsum, if formed from the addition of sulfuric acid for pH adjustment during conditioning, would be removed by filtration in the conditioning process prior to injection.

Attachment Q: RTC #99, #646, #659, #683, #692

Updated Cross Sections



LEGEND

CROSS-SECTION LOCATIONS

MONITORING WELL LOCATIONS*

PROPOSED REMEDIATION WELLS

NTH IRZ WELL LOCATIONS

FUTURE PROVISIONAL WELL LOCATIONS

RIVERBANK, TRANSWESTERN BENCH, AND EAST RAVINE EXTRACTION WELLS

FRESHWATER, IRL, AND TCS INJECTION WELLS

*WELLS A THROUGH S ARE PROPOSED WELLS

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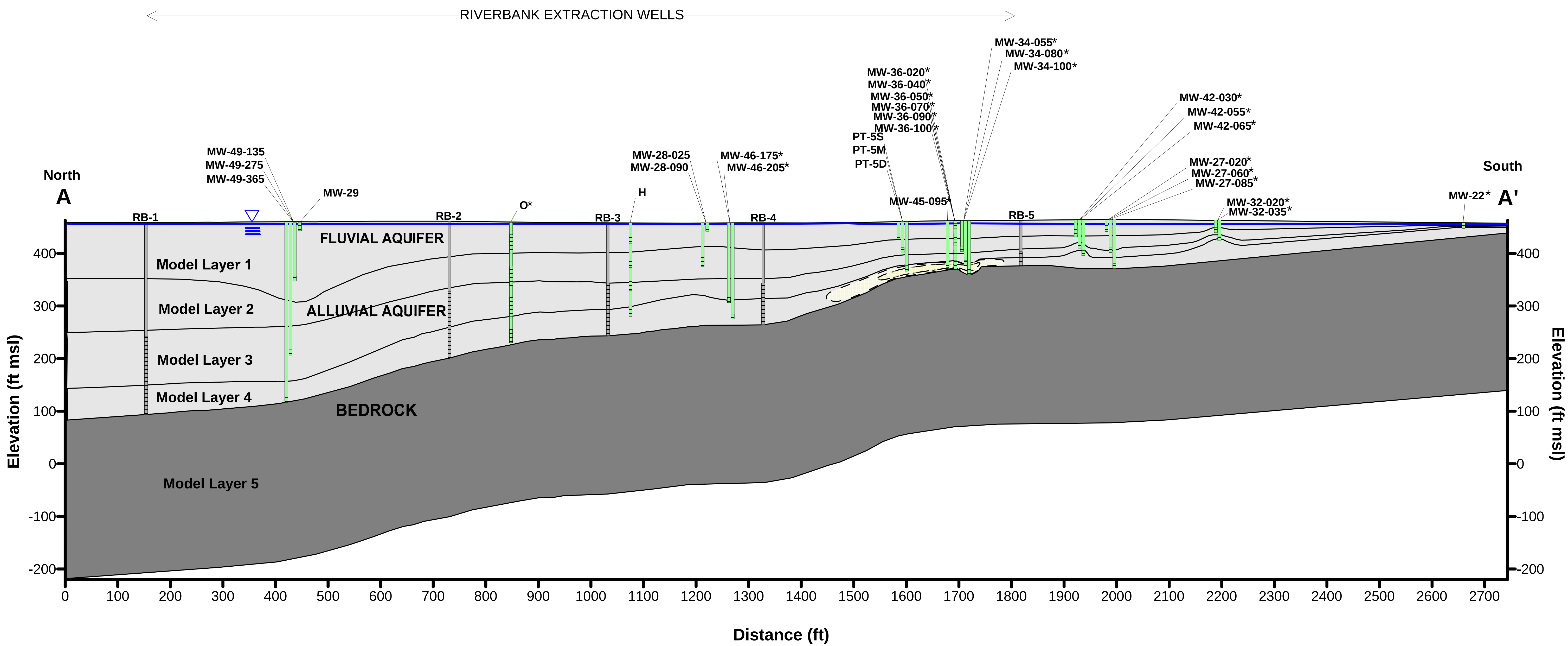
NEEDLES, CALIFORNIA
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION LOCATIONS

ARCADIS

FIGURE
6.4-2



*Well is projected onto cross-section. Actual well screen elevations are honored in all wells. Model layer boudaries are adjusted to correlate to the projected wells.

Proposed Remediation Well

Monitoring Well

Hexavalent Chromium Concentration (ppb)

32 | 100 | 500 | 1,000 | 5,000 | 10,000 | 15,000

Number of wells, total screen intervals, and screen length and depth placement at each well location ID are for purposes of intermediate (60%) design submittal; they are continuing to be evaluated through the design process and will be further modified during field installation. River Bank Extraction wells will be installed with a second shallow screen interval for potential future use which will be isolated from the deeper screen interval with a pneumatic packer.

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NEEDLES, CALIFORNIA
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION A-A'

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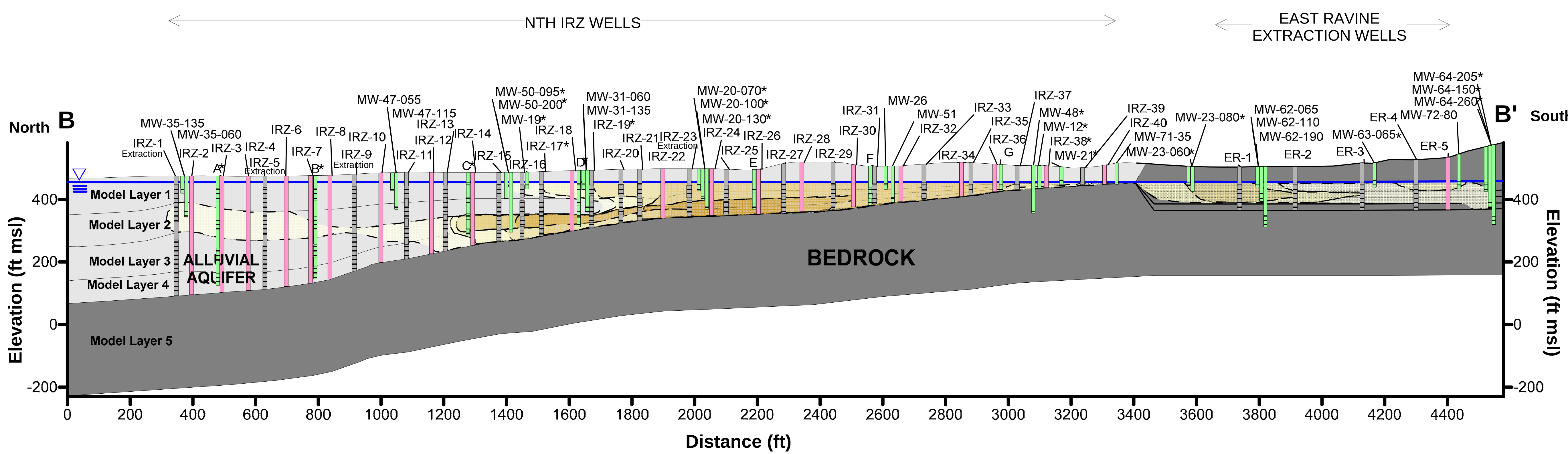
FIGURE
6.4-3



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Hexavalent Chromium Concentration (ppb)

32, 100, 500, 1,000, 5,000, 10,000, 15,000

Proposed Well

Future Provisional Well

Monitoring Well

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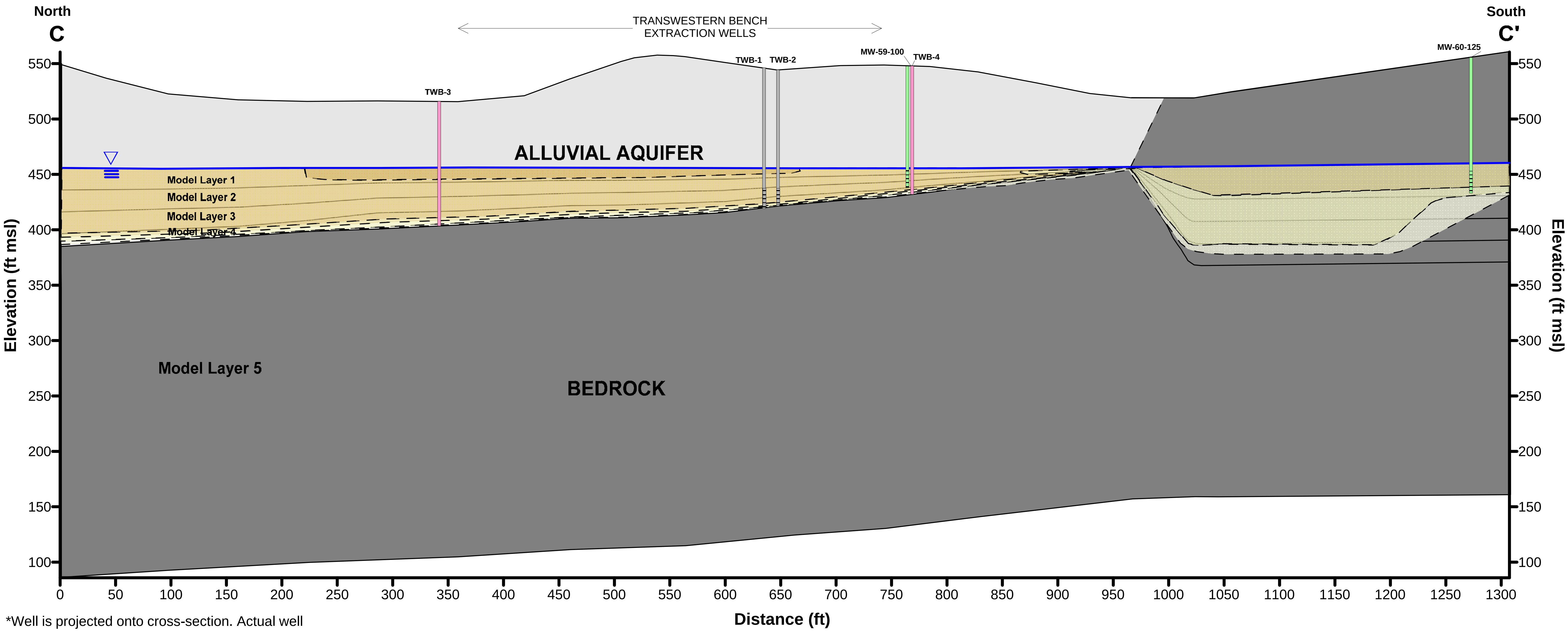
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION B-B'

ARCADIS

FIGURE
6.4-4



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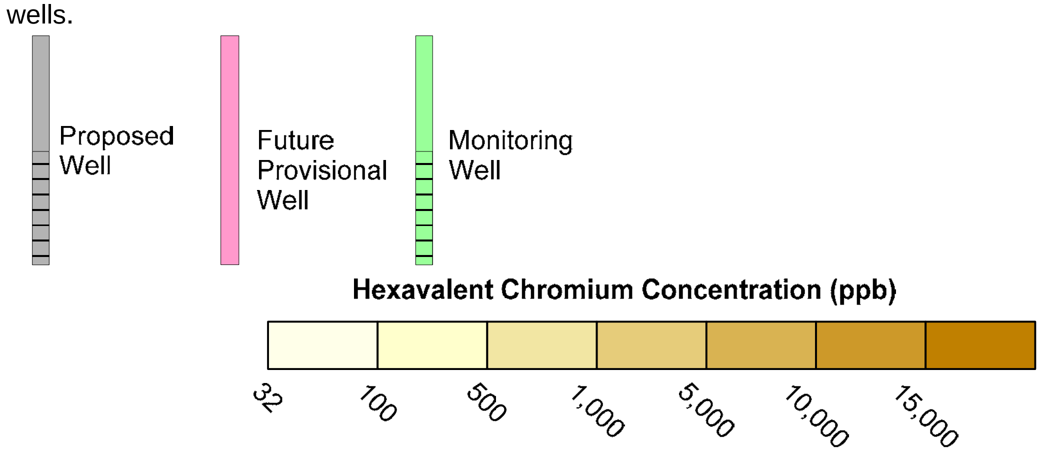

Number of wells, total screen intervals, and screen length and depth placement at each well location ID are for purposes of intermediate (60%) design submittal; they are continuing to be evaluated through the design process and will be further modified during field installation. One well location ID may consist of multiple screens, and one well screen interval may include more than one model layer. A maximum of two discrete screen intervals will be included per individual remediation well. Dual screen wells will consist of one well with two discreet screen intervals separated by a packer. Extraction well design and operation will target extraction of groundwater from all four model layers without being screened across all layers.

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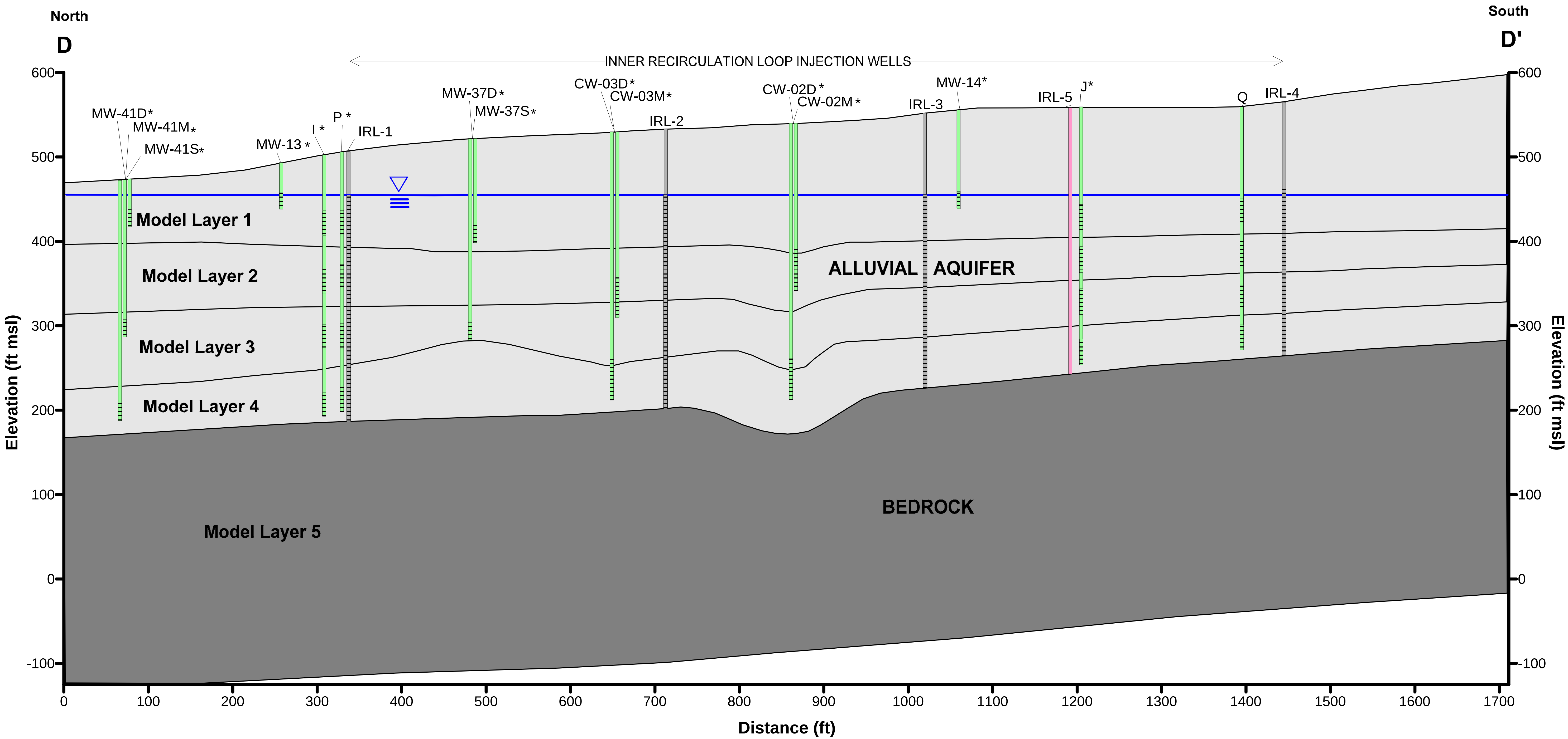
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION C-C'

ARCADIS

FIGURE
6.4-5



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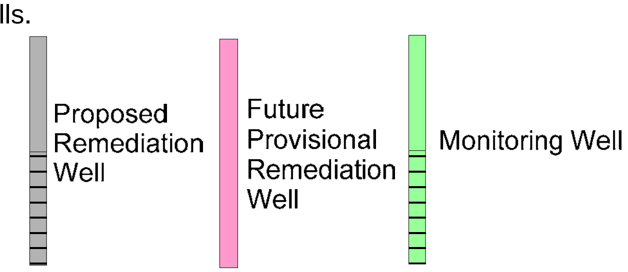

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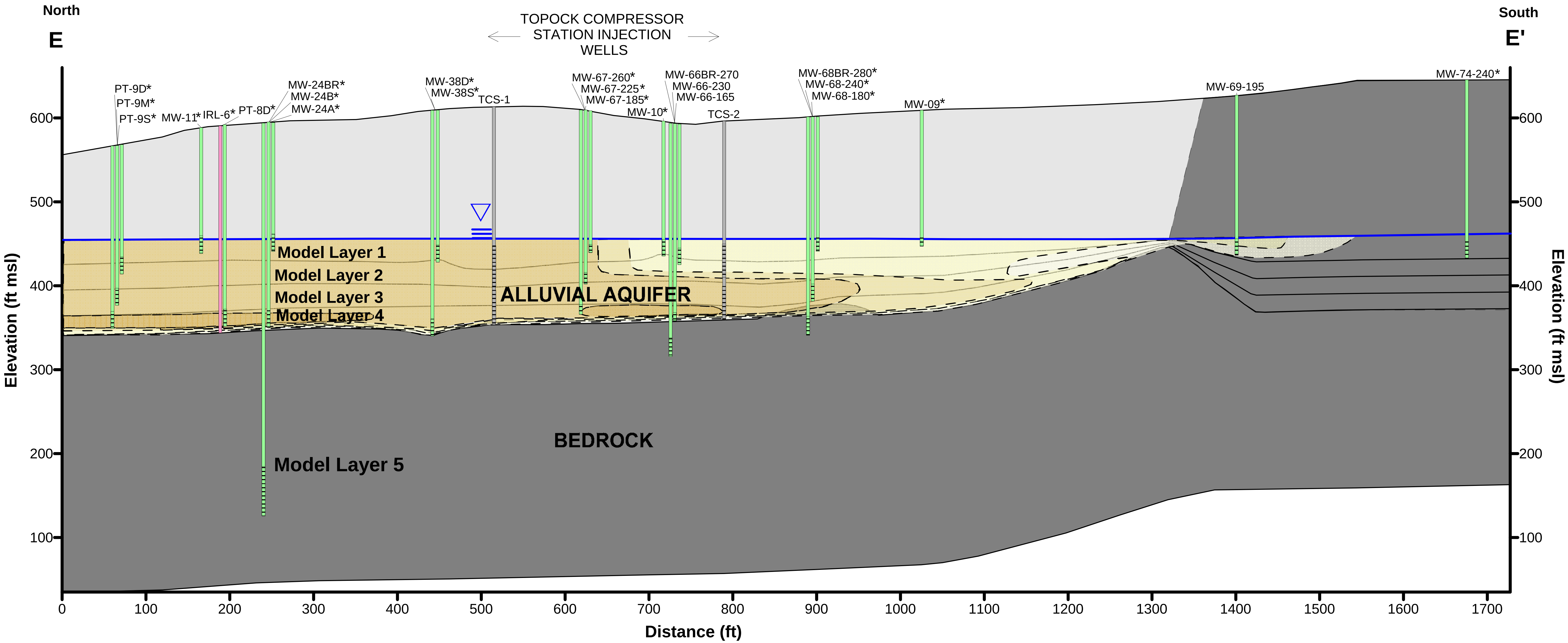
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION D-D'

ARCADIS

FIGURE
6.4-6



*Well is projected onto cross-section. Actual well screen elevations are honored in all wells. Model layer boudaries are adjusted to correlate to the projected wells.

Proposed Well

Future Provisional Well

Monitoring Well

Hexavalent Chromium Concentration (ppb)

32 | 100 | 500 | 1,000 | 5,000 | 10,000 | 15,000

Number of wells, total screen intervals, and screen length and depth placement at each well location ID are for purposes of intermediate (60%) design submittal; they are continuing to be evaluated through the design process and will be further modified during field installation. One well location ID may consist of multiple screens, and one well screen interval may include more than one model layer. A maximum of two discrete screen intervals will be included per individual remediation well. Dual screen wells will consist of one well with two discreet screen intervals separated by a packer.

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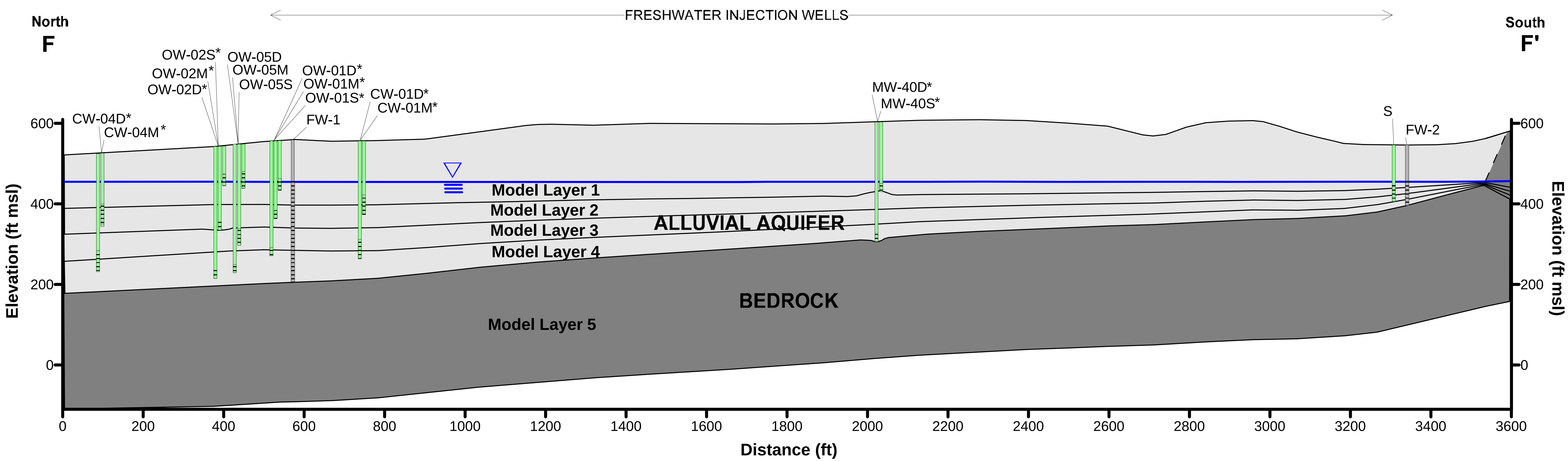
CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION E-E'

ARCADIS

FIGURE
6.4-7



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Proposed Remediation Well

Monitoring Well

Number of wells, total screen intervals, and screen length and depth placement at each well location ID are for purposes of intermediate (60%) design submittal; they are continuing to be evaluated through the design process and will be further modified during field installation.

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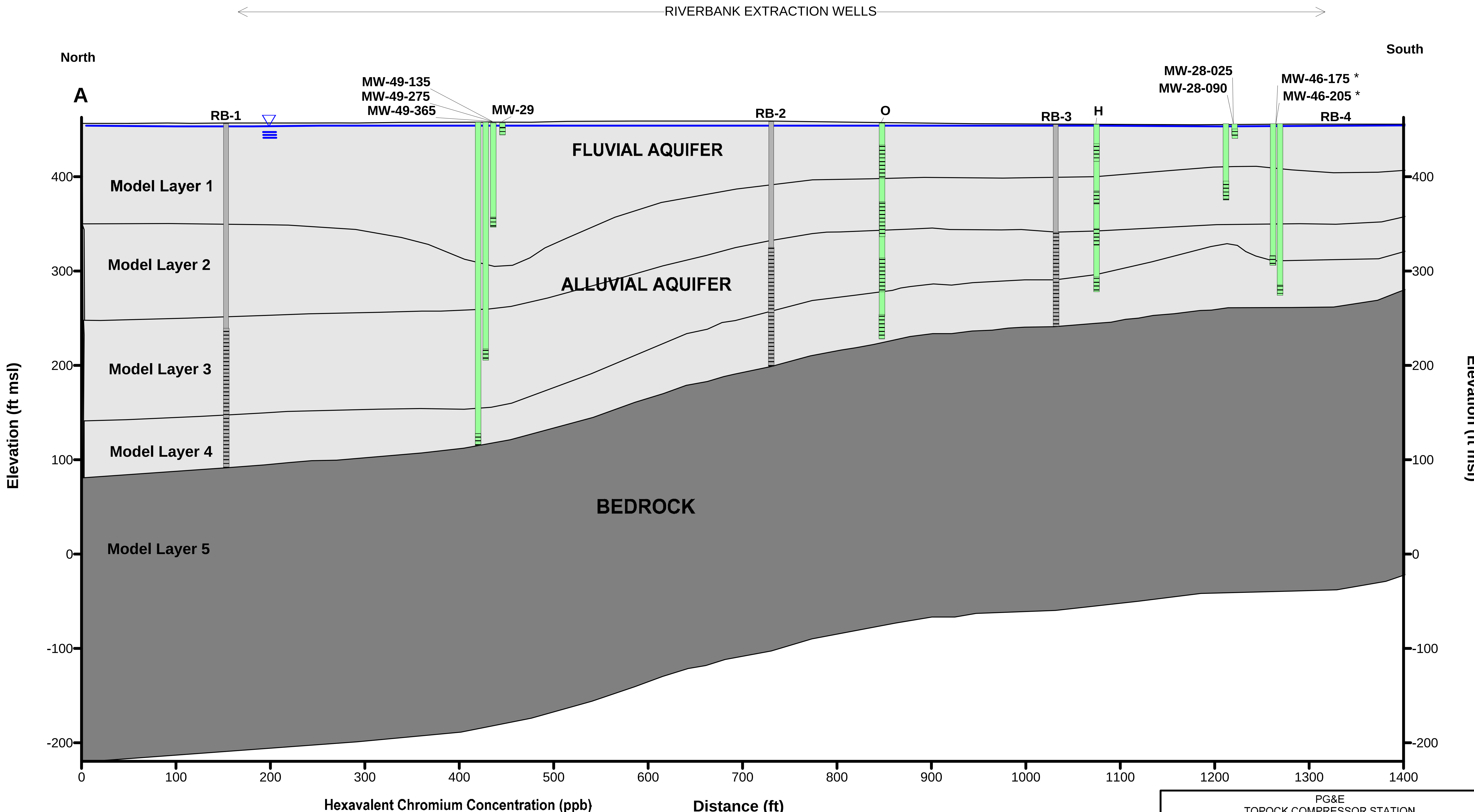
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION F-F'

ARCADIS

FIGURE
6.4-8



Proposed Remediation Well

Monitoring Well

Hexavalent Chromium Concentration (ppb)

32 | 100 | 500 | 1,000 | 5,000 | 10,000 | 15,000

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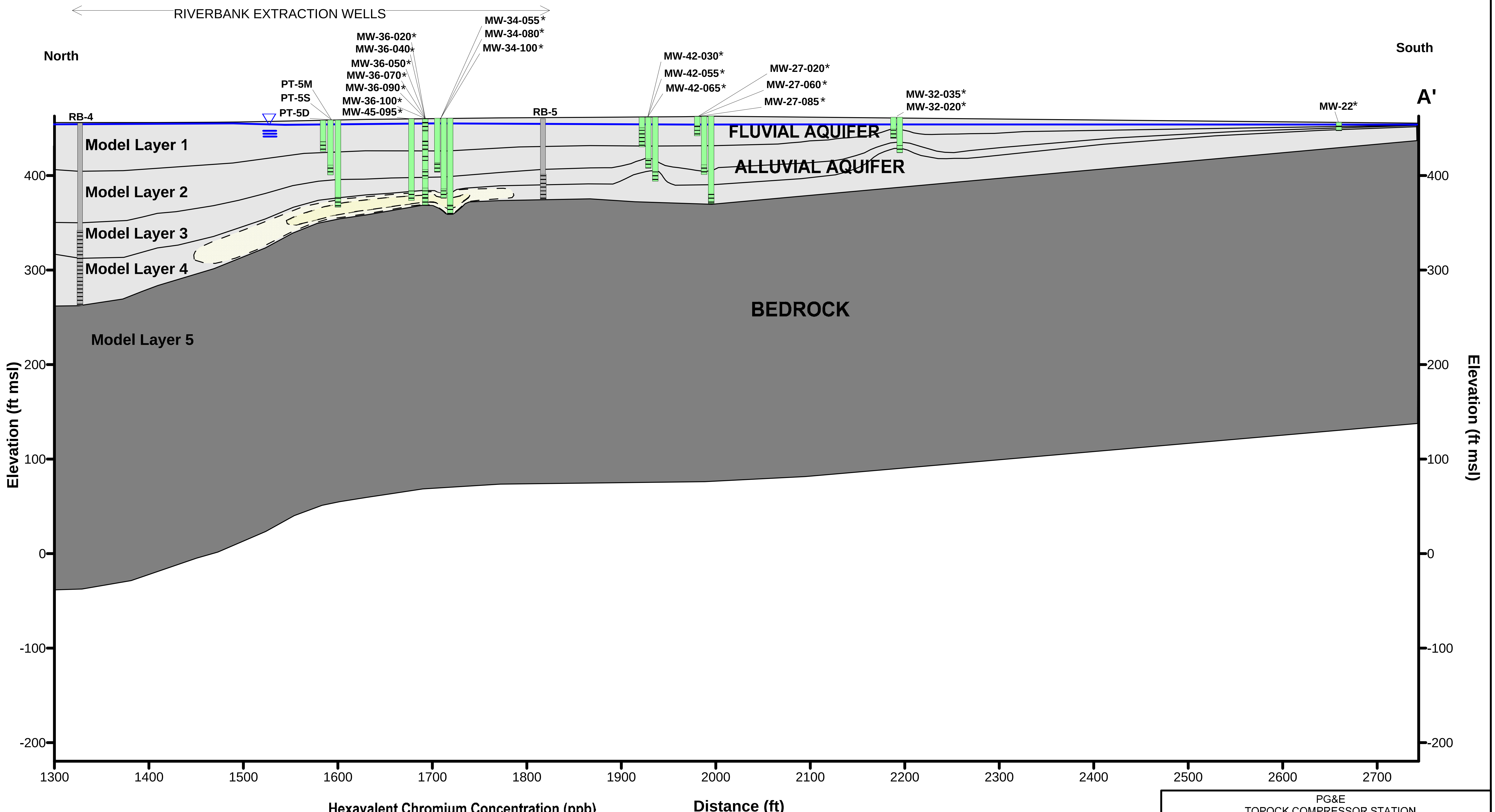
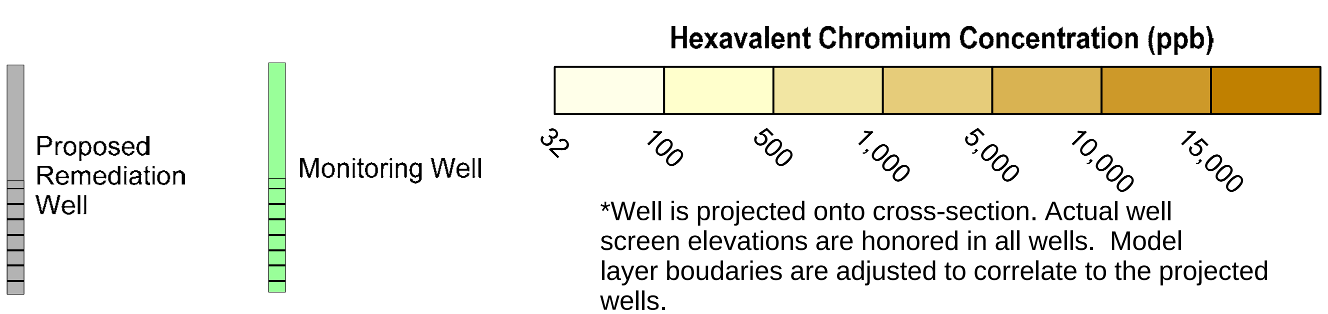
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION A-A'

ARCADIS

FIGURE
6.4-3





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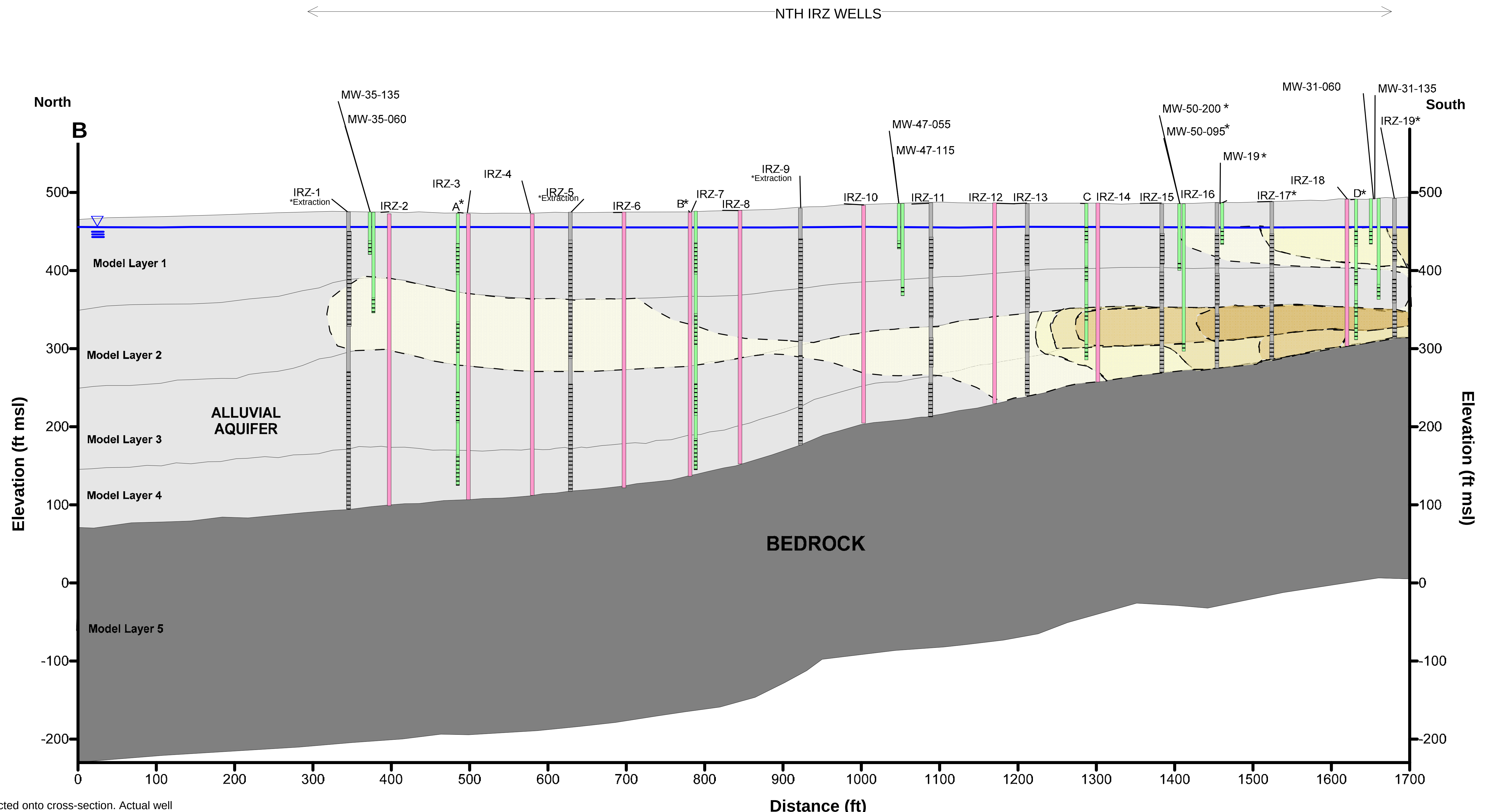
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION A-A'

ARCADIS

FIGURE
6.4-3



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Hexavalent Chromium Concentration (ppb)

32 | 100 | 500 | 1,000 | 5,000 | 10,000 | 15,000

Proposed Well

Future Provisional Well

Monitoring Well

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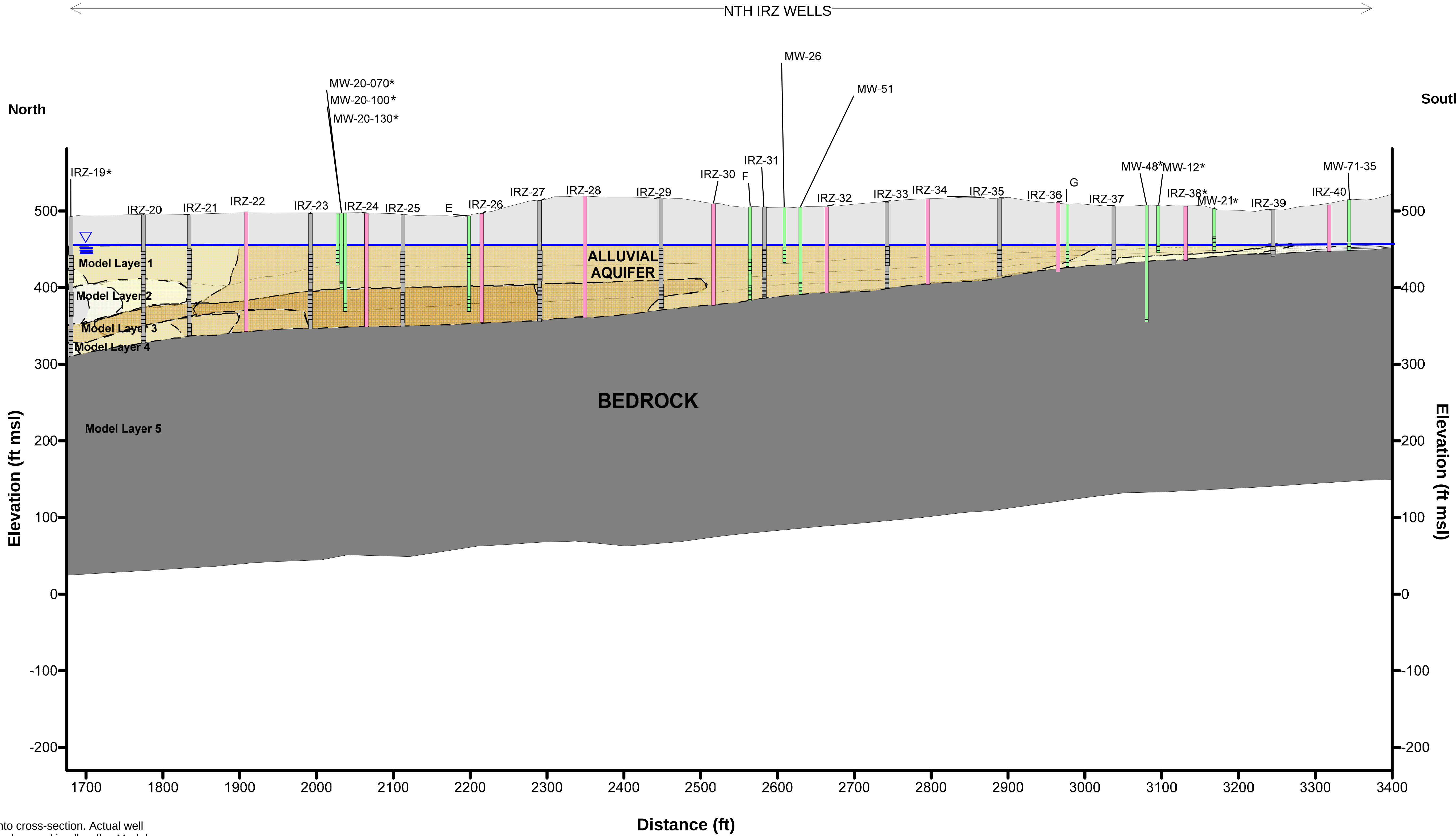
NEEDLES, CALIFORNIA
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION B-B'

ARCADIS

FIGURE
6.4-4



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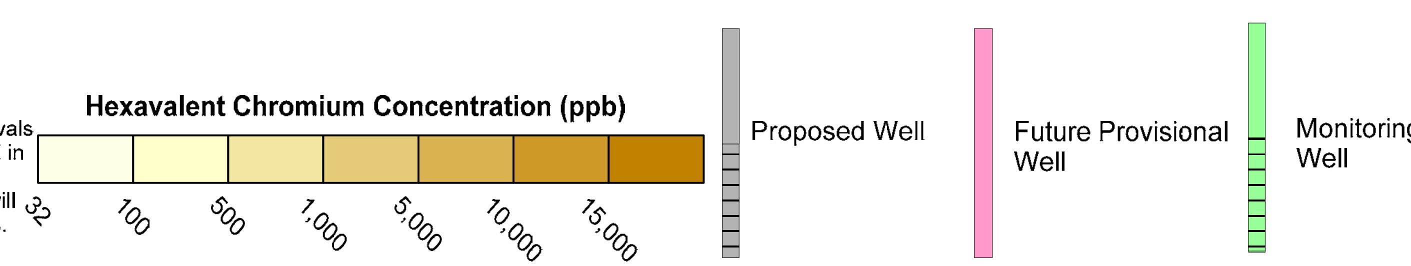

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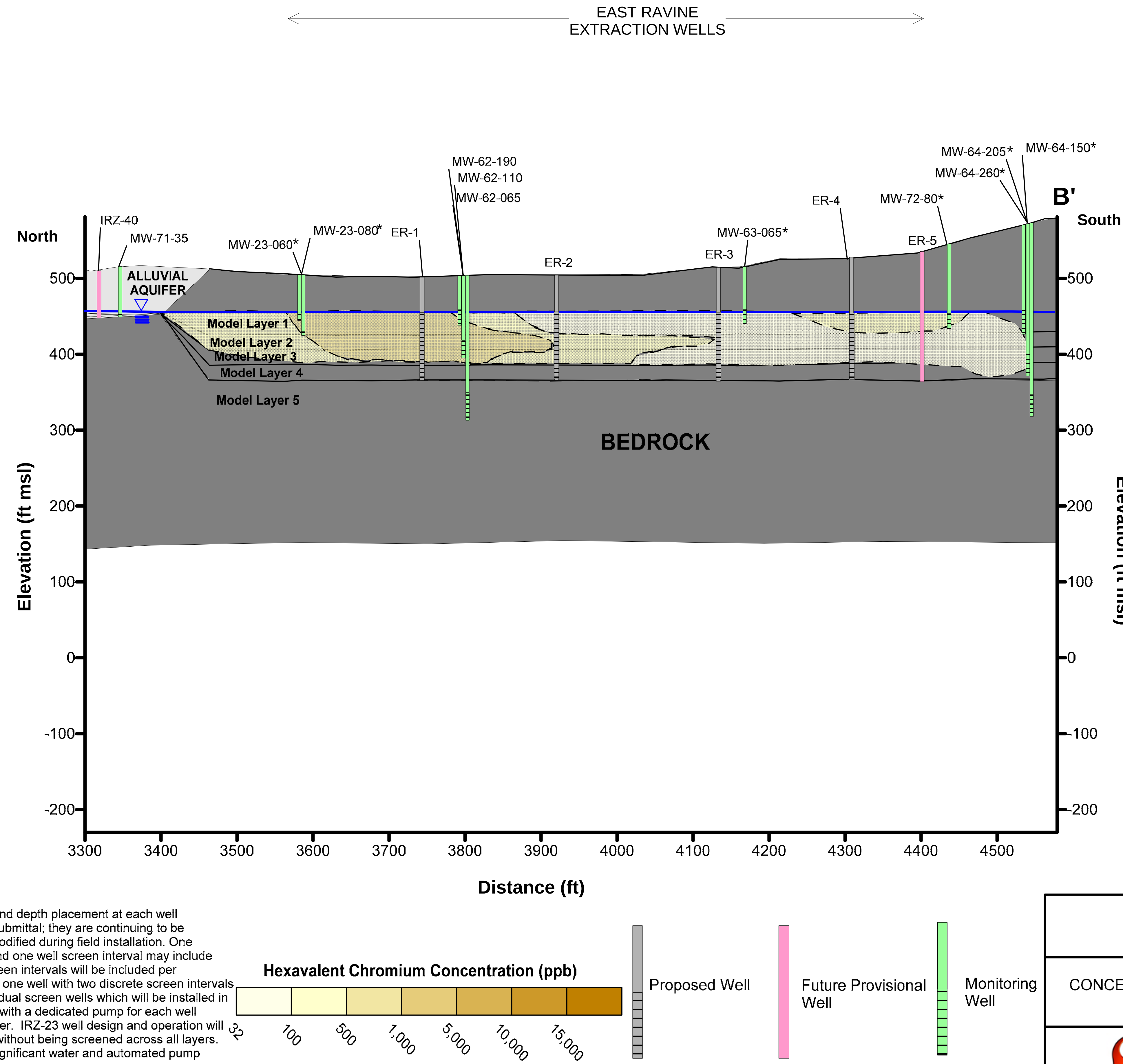
NEEDLES, CALIFORNIA
MODELING APPENDIX

CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION B-B'

ARCADIS

FIGURE
6.4-4



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MODELING APPENDIX

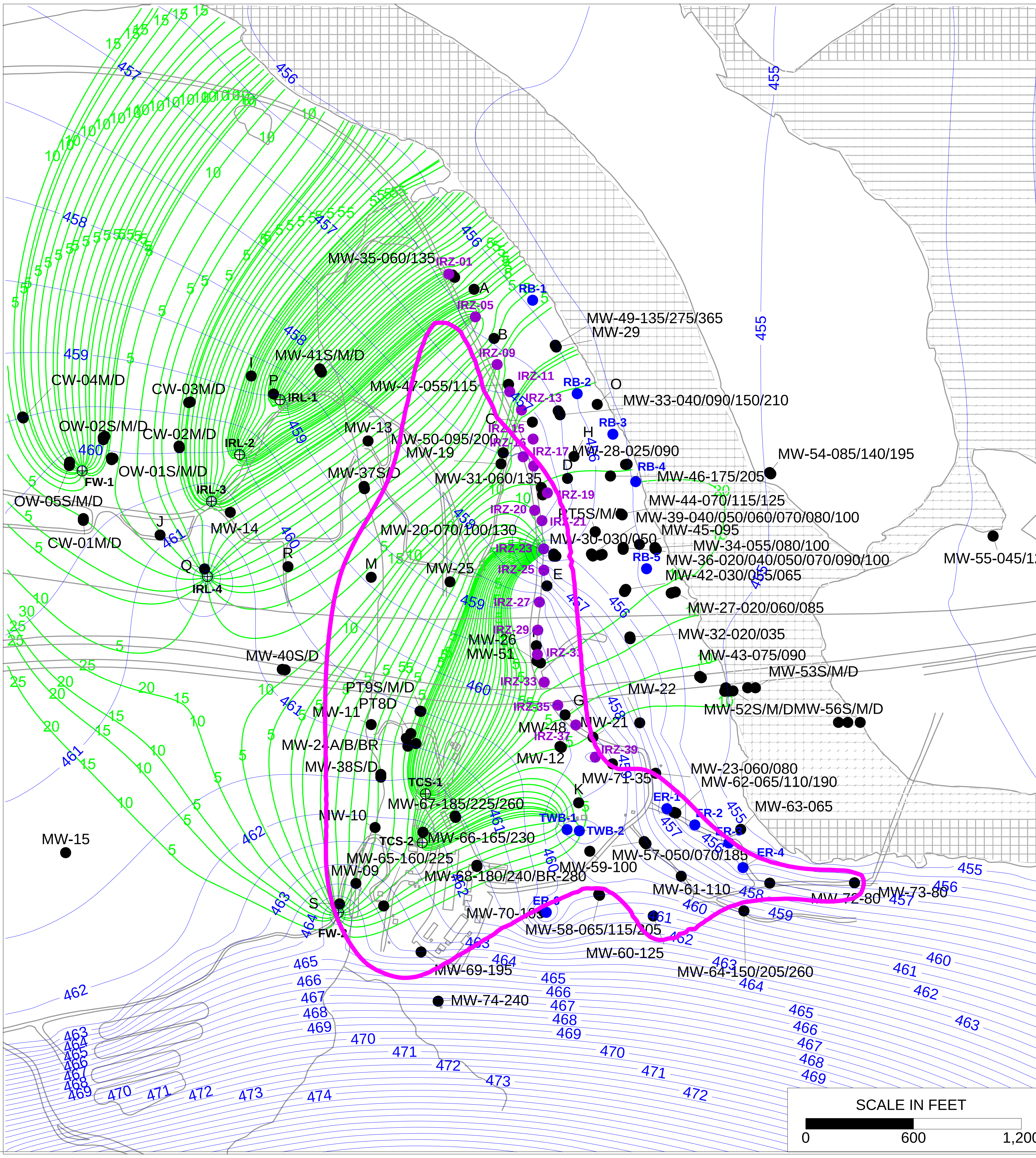
CONCEPTUAL FINAL GROUNDWATER REMEDY
CROSS-SECTION B-B'

ARCADIS

FIGURE
6.4-4

Attachment R: RTC #216, #648, #692

Simulated Subsurface Groundwater Flow and Pathline Figures



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- 5 SIMULATED GROUNDWATER PARTICLE PATHLINE* (5 YEAR POSTINGS)

SIMULATED PUMPING RATES

NTH IRZ (300 gpm)

EXTRACTION	INJECTION
NTH IRZ = 300 gpm	NTH IRZ = 300 gpm

TCS LOOP (27 gpm)

EXTRACTION	INJECTION
ER-1 = 0.5 gpm	TCS-1 = 13.5 gpm
ER-2 = 0.5 gpm	TCS-2 = 13.5 gpm
ER-3 = 0.5 gpm	
ER-4 = 0.5 gpm	
ER-6 = 3 gpm	
TWB-1 = 13 gpm	
TWB-2 = 9 gpm	

IRL LOOP (150 gpm)

EXTRACTION	INJECTION
RB-1 = 25 gpm	IRL-1 = 75 gpm
RB-2 = OFF	IRL-2 = 75 gpm
RB-3 = 50 gpm	
RB-4 = 50 gpm	
RB-5 = 25 gpm	

FRESHWATER (450 gpm)

EXTRACTION	INJECTION
HNWR-1 = 450 gpm	FW-1 = 100 gpm
	FW-2 = 50 gpm
	IRL-3 = 100 gpm
	IRL-4 = 200 gpm

*Simulated particle pathlines depict simulated groundwater flow and are not representative of solute transport as they do not take into account mechanisms such as sorption, reduction, oxidation, degradation, etc.

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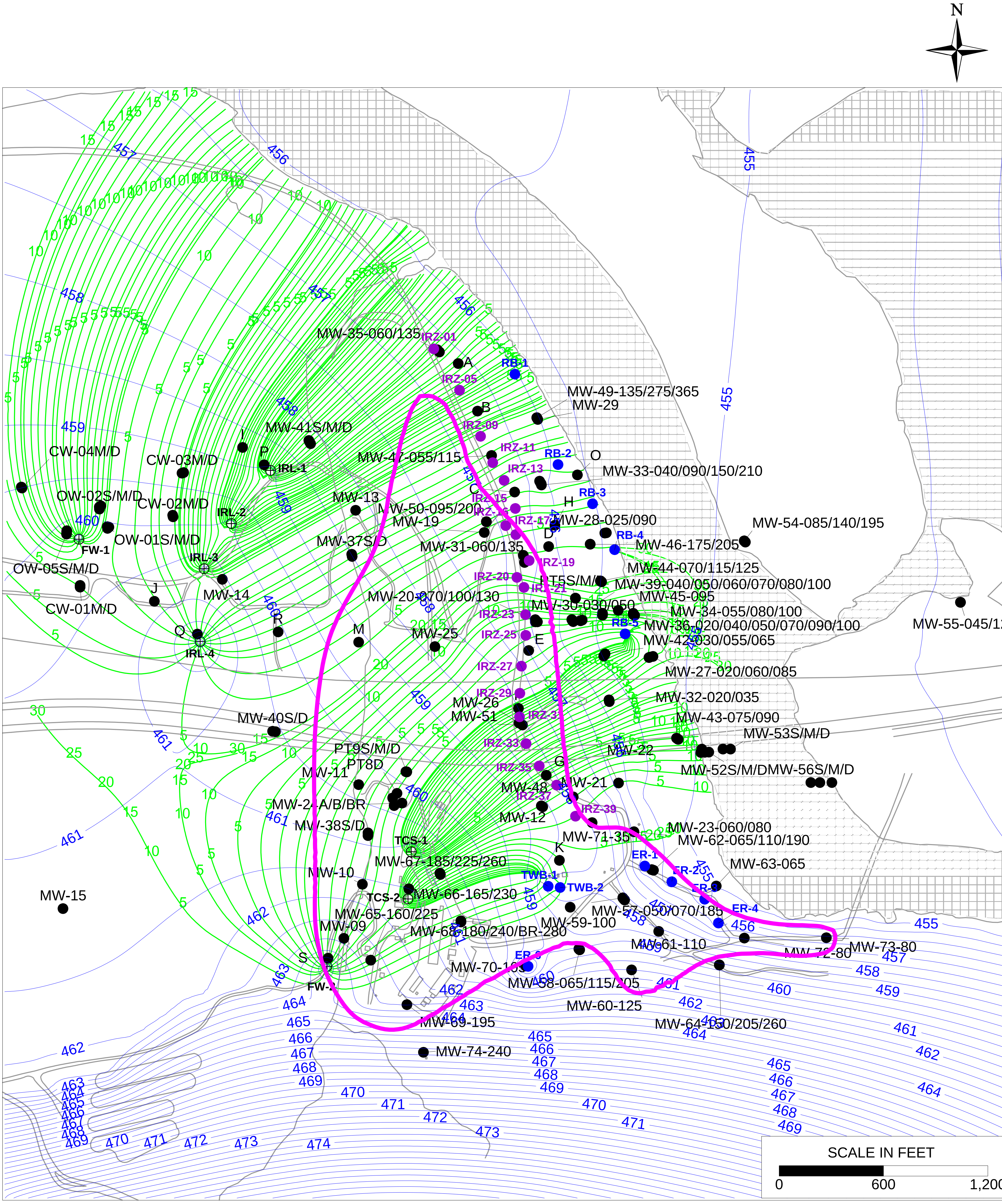
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND PATHLINES MODEL LAYER 1 - NTH IRZ ON

ARCADIS

FIGURE
1A



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- 5 SIMULATED GROUNDWATER PARTICLE PATHLINE* (5 YEAR POSTINGS)

SIMULATED PUMPING RATES

NTH IRZ (OFF)

EXTRACTION	INJECTION
NTH IRZ = OFF	NTH IRZ = OFF

TCS LOOP (27 gpm)

EXTRACTION	INJECTION
ER-1 = 0.5 gpm	TCS-1 = 13.5 gpm
ER-2 = 0.5 gpm	TCS-2 = 13.5 gpm
ER-3 = 0.5 gpm	
ER-4 = 0.5 gpm	
ER-6 = 3 gpm	
TWB-1 = 13 gpm	
TWB-2 = 9 gpm	

IRL LOOP (150 gpm)

EXTRACTION	INJECTION
RB-1 = 25 gpm	IRL-1 = 75 gpm
RB-2 = OFF	IRL-2 = 75 gpm
RB-3 = 50 gpm	
RB-4 = 50 gpm	
RB-5 = 25 gpm	

FRESHWATER (450 gpm)

EXTRACTION	INJECTION
HNWR-1 = 450 gpm	FW-1 = 100 gpm
	FW-2 = 50 gpm
	IRL-3 = 100 gpm
	IRL-4 = 200 gpm

*Simulated particle pathlines depict simulated groundwater flow and are not representative of solute transport as they do not take into account mechanisms such as sorption, reduction, oxidation, degradation, etc.

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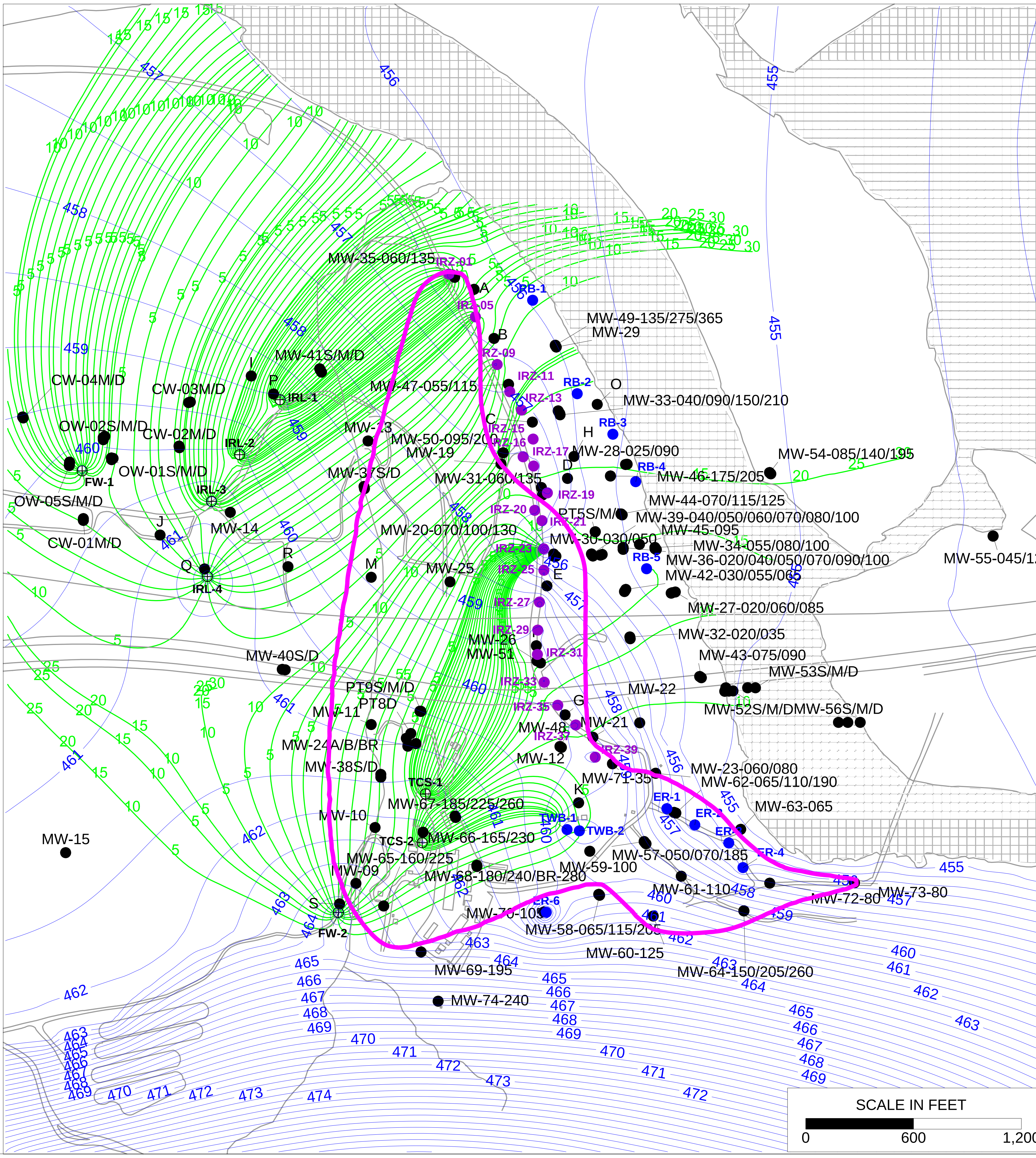
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND PATHLINES
MODEL LAYER 1 - NTH IRZ OFF

ARCADIS

FIGURE
1B



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- 5 SIMULATED GROUNDWATER PARTICLE PATHLINE* (5 YEAR POSTINGS)

SIMULATED PUMPING RATES

NTH IRZ (300 gpm)

EXTRACTION	INJECTION
NTH IRZ = 300 gpm	NTH IRZ = 300 gpm

TCS LOOP (27 gpm)

EXTRACTION	INJECTION
ER-1 = 0.5 gpm	TCS-1 = 13.5 gpm
ER-2 = 0.5 gpm	TCS-2 = 13.5 gpm
ER-3 = 0.5 gpm	
ER-4 = 0.5 gpm	
ER-6 = 3 gpm	
TWB-1 = 13 gpm	
TWB-2 = 9 gpm	

IRL LOOP (150 gpm)

EXTRACTION	INJECTION
RB-1 = 25 gpm	IRL-1 = 75 gpm
RB-2 = OFF	IRL-2 = 75 gpm
RB-3 = 50 gpm	
RB-4 = 50 gpm	
RB-5 = 25 gpm	

FRESHWATER (450 gpm)

EXTRACTION	INJECTION
HNWR-1 = 450 gpm	FW-1 = 100 gpm
	FW-2 = 50 gpm
	IRL-3 = 100 gpm
	IRL-4 = 200 gpm

*Simulated particle pathlines depict simulated groundwater flow and are not representative of solute transport as they do not take into account mechanisms such as sorption, reduction, oxidation, degradation, etc.

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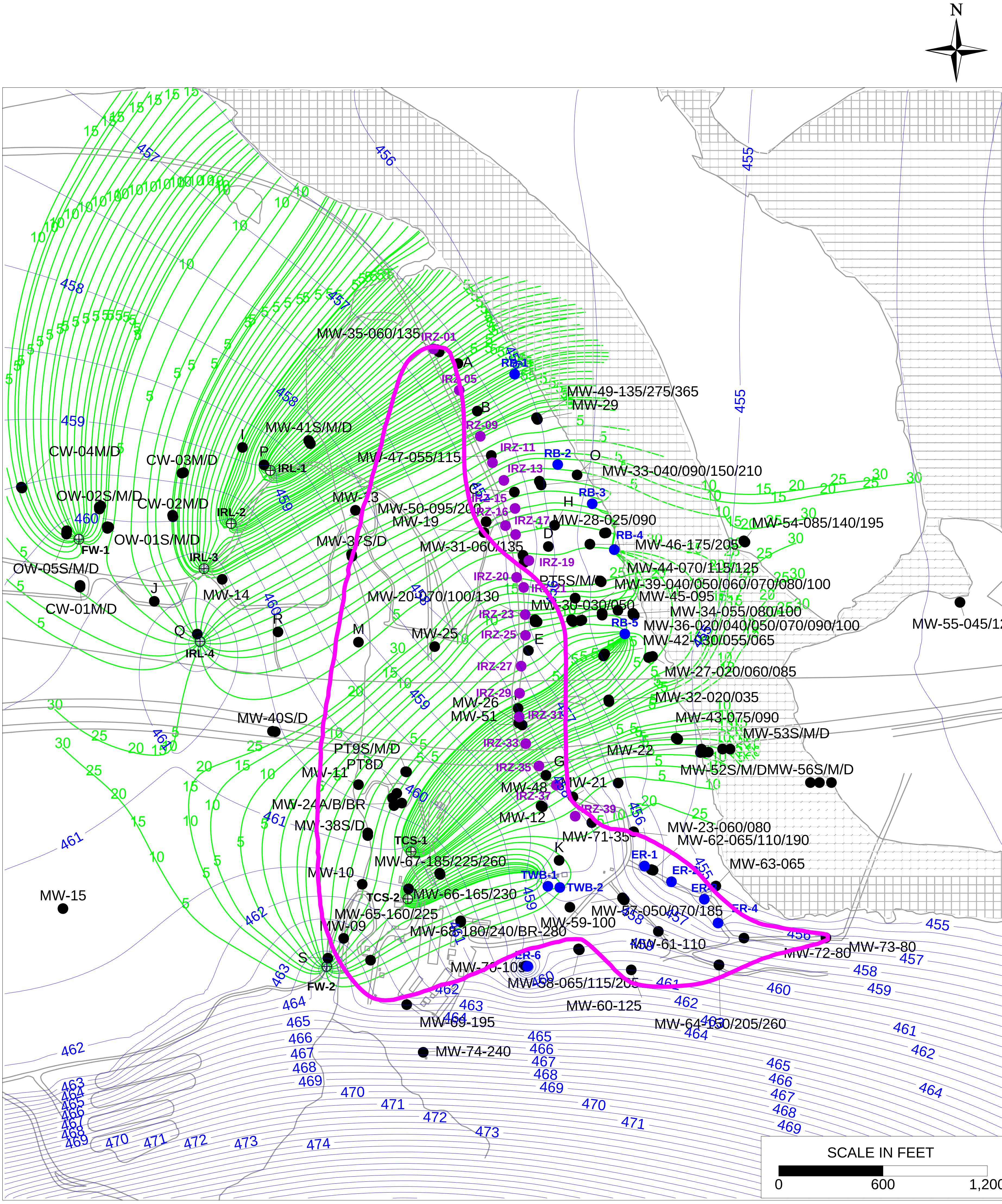
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND PATHLINES MODEL LAYER 2 - NTH IRZ ON

ARCADIS

FIGURE 2A



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- 5 SIMULATED GROUNDWATER PARTICLE PATHLINE*
(5 YEAR POSTINGS)

SIMULATED PUMPING RATES

NTH IRZ (OFF)

EXTRACTION	INJECTION
NTH IRZ = OFF	NTH IRZ = OFF

TCS LOOP (27 gpm)

EXTRACTION	INJECTION
ER-1 = 0.5 gpm	TCS-1 = 13.5 gpm
ER-2 = 0.5 gpm	TCS-2 = 13.5 gpm
ER-3 = 0.5 gpm	
ER-4 = 0.5 gpm	
ER-6 = 3 gpm	
TWB-1 = 13 gpm	
TWB-2 = 9 gpm	

IRL LOOP (150 gpm)

EXTRACTION	INJECTION
RB-1 = 25 gpm	IRL-1 = 75 gpm
RB-2 = OFF	IRL-2 = 75 gpm
RB-3 = 50 gpm	
RB-4 = 50 gpm	
RB-5 = 25 gpm	

FRESHWATER (450 gpm)

EXTRACTION	INJECTION
HNWR-1 = 450 gpm	FW-1 = 100 gpm
	FW-2 = 50 gpm
	IRL-3 = 100 gpm
	IRL-4 = 200 gpm

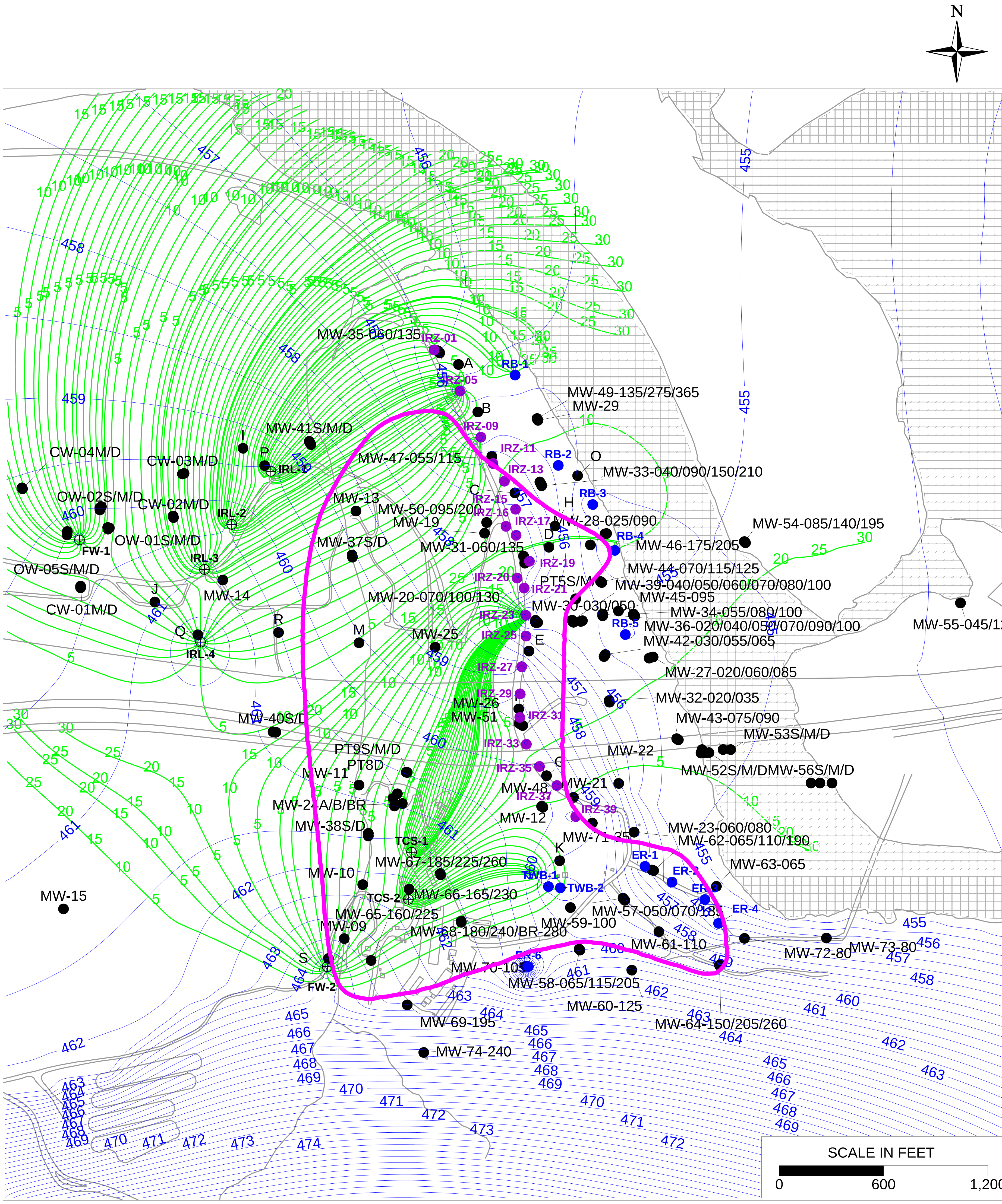
*Simulated particle pathlines depict simulated groundwater flow and are not representative of solute transport as they do not take into account mechanisms such as sorption, reduction, oxidation, degradation, etc.

PG&E
TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND PATHLINES
MODEL LAYER 2 - NTH IRZ OFF

ARCADIS

FIGURE
2B



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- 5 SIMULATED GROUNDWATER PARTICLE PATHLINE* (5 YEAR POSTINGS)

SIMULATED PUMPING RATES

NTH IRZ (300 gpm)

EXTRACTION	INJECTION
NTH IRZ = 300 gpm	NTH IRZ = 300 gpm

TCS LOOP (27 gpm)

EXTRACTION	INJECTION
ER-1 = 0.5 gpm	TCS-1 = 13.5 gpm
ER-2 = 0.5 gpm	TCS-2 = 13.5 gpm
ER-3 = 0.5 gpm	
ER-4 = 0.5 gpm	
ER-6 = 3 gpm	
TWB-1 = 13 gpm	
TWB-2 = 9 gpm	

IRL LOOP (150 gpm)

EXTRACTION	INJECTION
RB-1 = 25 gpm	IRL-1 = 75 gpm
RB-2 = OFF	IRL-2 = 75 gpm
RB-3 = 50 gpm	
RB-4 = 50 gpm	
RB-5 = 25 gpm	

FRESHWATER (450 gpm)

EXTRACTION	INJECTION
HNWR-1 = 450 gpm	FW-1 = 100 gpm
	FW-2 = 50 gpm
	IRL-3 = 100 gpm
	IRL-4 = 200 gpm

*Simulated particle pathlines depict simulated groundwater flow and are not representative of solute transport as they do not take into account mechanisms such as sorption, reduction, oxidation, degradation, etc.

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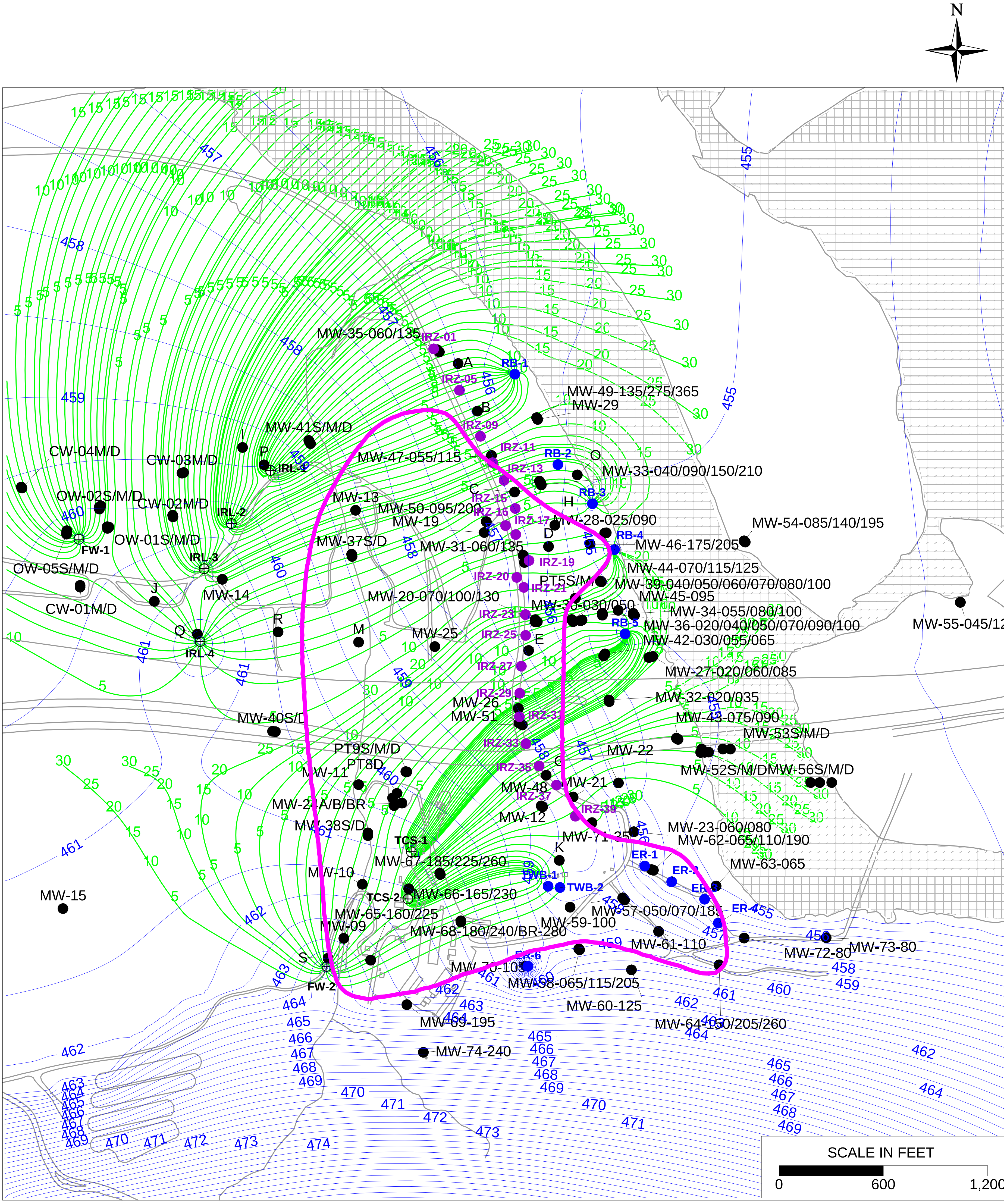
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND PATHLINES MODEL LAYER 3 - NTH IRZ ON

ARCADIS

FIGURE 3A



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- 5 SIMULATED GROUNDWATER PARTICLE PATHLINE* (5 YEAR POSTINGS)

SIMULATED PUMPING RATES

NTH IRZ (OFF)

EXTRACTION	INJECTION
NTH IRZ = OFF	NTH IRZ = OFF

TCS LOOP (27 gpm)

EXTRACTION	INJECTION
ER-1 = 0.5 gpm	TCS-1 = 13.5 gpm
ER-2 = 0.5 gpm	TCS-2 = 13.5 gpm
ER-3 = 0.5 gpm	
ER-4 = 0.5 gpm	
ER-6 = 3 gpm	
TWB-1 = 13 gpm	
TWB-2 = 9 gpm	

IRL LOOP (150 gpm)

EXTRACTION	INJECTION
RB-1 = 25 gpm	IRL-1 = 75 gpm
RB-2 = OFF	IRL-2 = 75 gpm
RB-3 = 50 gpm	
RB-4 = 50 gpm	
RB-5 = 25 gpm	

FRESHWATER (450 gpm)

EXTRACTION	INJECTION
HNWR-1 = 450 gpm	FW-1 = 100 gpm
	FW-2 = 50 gpm
	IRL-3 = 100 gpm
	IRL-4 = 200 gpm

*Simulated particle pathlines depict simulated groundwater flow and are not representative of solute transport as they do not take into account mechanisms such as sorption, reduction, oxidation, degradation, etc.

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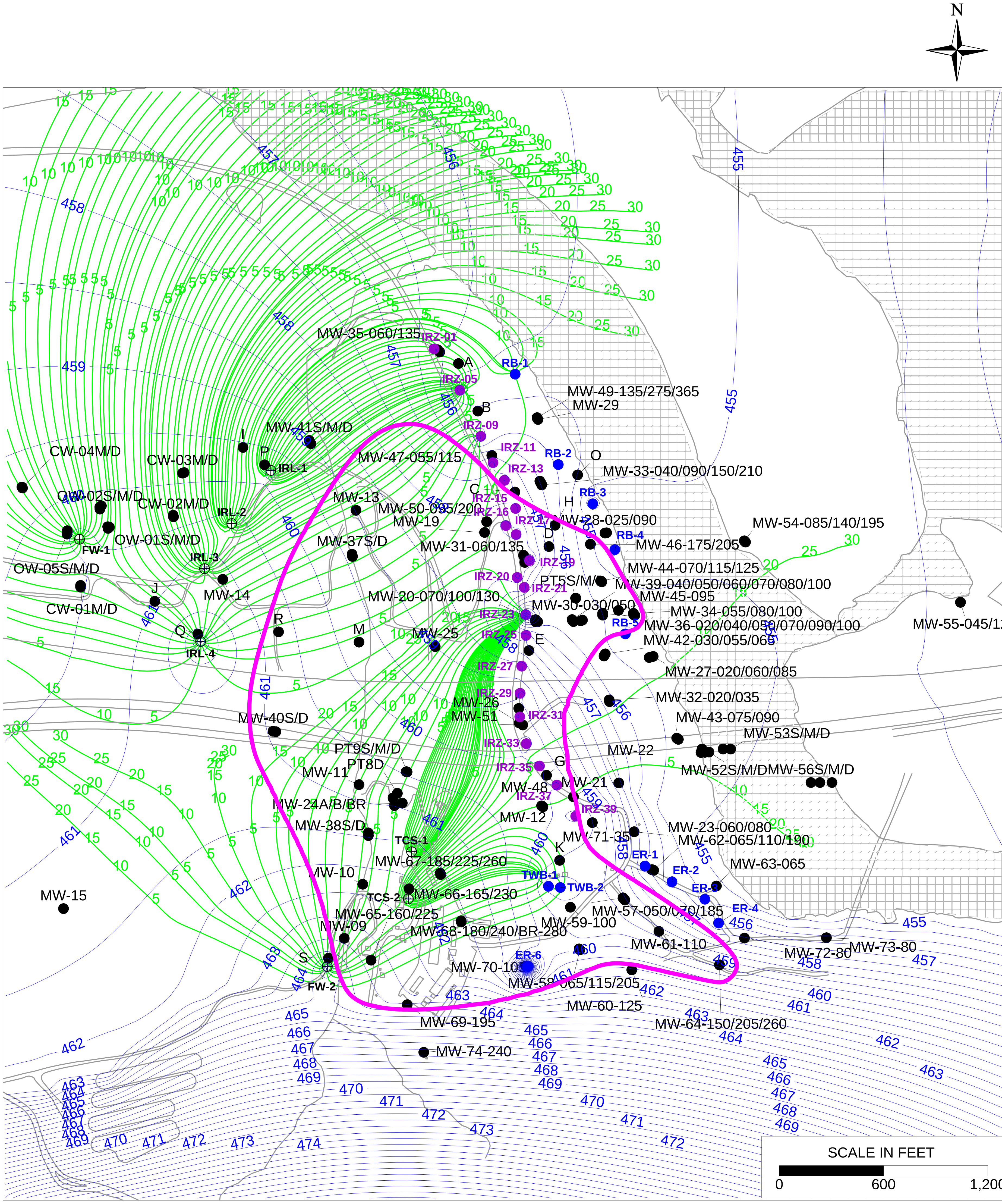
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND PATHLINES MODEL LAYER 3 - NTH IRZ OFF

ARCADIS

FIGURE
3B



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- 5 SIMULATED GROUNDWATER PARTICLE PATHLINE* (5 YEAR POSTINGS)

SIMULATED PUMPING RATES

NTH IRZ (300 gpm)

EXTRACTION	INJECTION
NTH IRZ = 300 gpm	NTH IRZ = 300 gpm

TCS LOOP (27 gpm)

EXTRACTION	INJECTION
ER-1 = 0.5 gpm	TCS-1 = 13.5 gpm
ER-2 = 0.5 gpm	TCS-2 = 13.5 gpm
ER-3 = 0.5 gpm	
ER-4 = 0.5 gpm	
ER-6 = 3 gpm	
TWB-1 = 13 gpm	
TWB-2 = 9 gpm	

IRL LOOP (150 gpm)

EXTRACTION	INJECTION
RB-1 = 25 gpm	IRL-1 = 75 gpm
RB-2 = OFF	IRL-2 = 75 gpm
RB-3 = 50 gpm	
RB-4 = 50 gpm	
RB-5 = 25 gpm	

FRESHWATER (450 gpm)

EXTRACTION	INJECTION
HNWR-1 = 450 gpm	FW-1 = 100 gpm
	FW-2 = 50 gpm
	IRL-3 = 100 gpm
	IRL-4 = 200 gpm

*Simulated particle pathlines depict simulated groundwater flow and are not representative of solute transport as they do not take into account mechanisms such as sorption, reduction, oxidation, degradation, etc.

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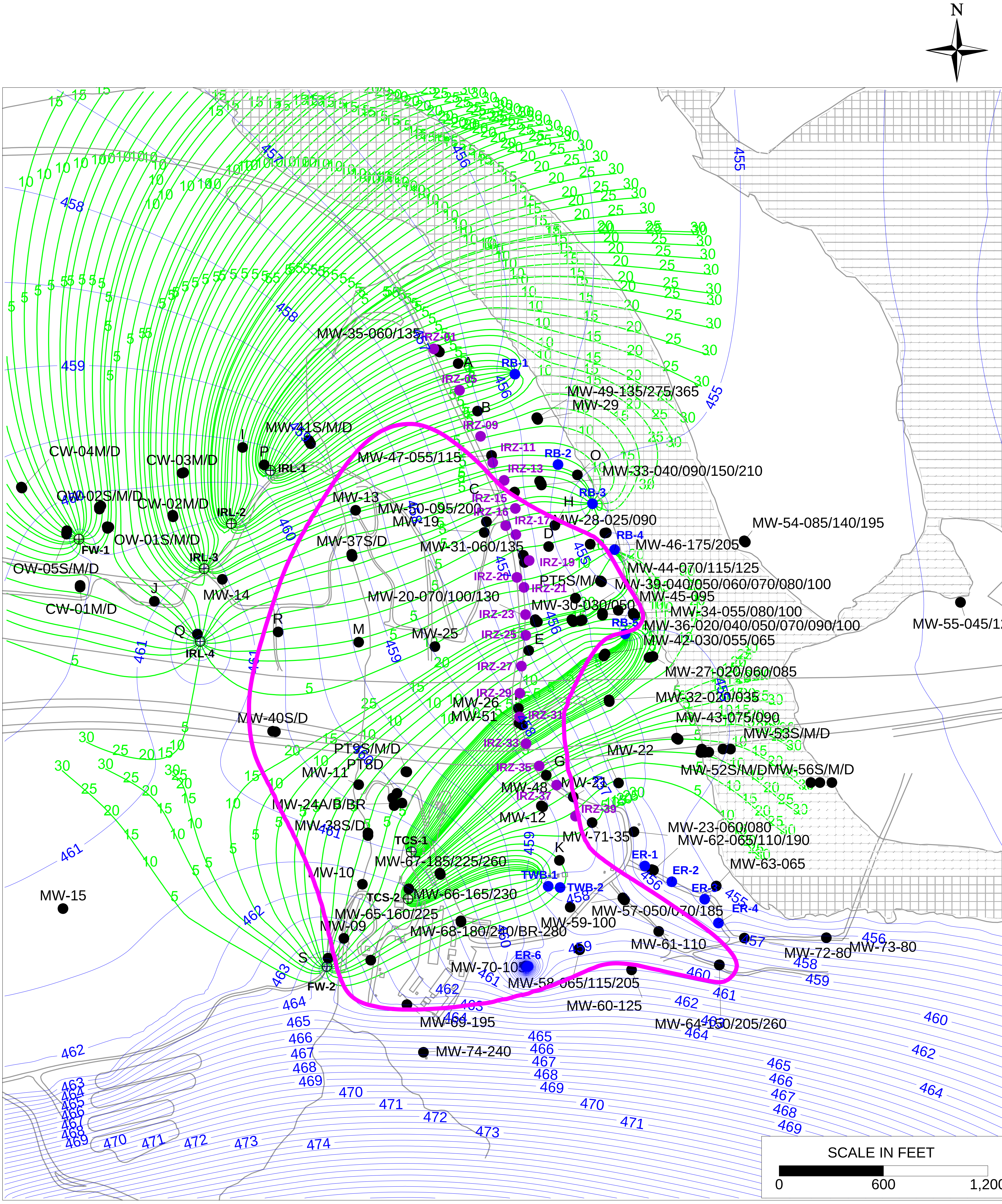
NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND PATHLINES MODEL LAYER 4 - NTH IRZ ON

ARCADIS

FIGURE 4A



LEGEND

- IRZ WELLS
- UPGRADIENT INJECTION WELLS
- EXTRACTION WELLS
- MONITORING WELLS
- 460 SIMULATED GROUNDWATER LEVELS (FT MSL)
- ESTIMATED HEXAVALENT CHROMIUM 32 ug/L CONTOUR
- 5 SIMULATED GROUNDWATER PARTICLE PATHLINE* (5 YEAR POSTINGS)

SIMULATED PUMPING RATES

NTH IRZ (OFF)

EXTRACTION	INJECTION
NTH IRZ = OFF	NTH IRZ = OFF

TCS LOOP (27 gpm)

EXTRACTION	INJECTION
ER-1 = 0.5 gpm	TCS-1 = 13.5 gpm
ER-2 = 0.5 gpm	TCS-2 = 13.5 gpm
ER-3 = 0.5 gpm	
ER-4 = 0.5 gpm	
ER-6 = 3 gpm	
TWB-1 = 13 gpm	
TWB-2 = 9 gpm	

IRL LOOP (150 gpm)

EXTRACTION	INJECTION
RB-1 = 25 gpm	IRL-1 = 75 gpm
RB-2 = OFF	IRL-2 = 75 gpm
RB-3 = 50 gpm	
RB-4 = 50 gpm	
RB-5 = 25 gpm	

FRESHWATER (450 gpm)

EXTRACTION	INJECTION
HNWR-1 = 450 gpm	FW-1 = 100 gpm
	FW-2 = 50 gpm
	IRL-3 = 100 gpm
	IRL-4 = 200 gpm

*Simulated particle pathlines depict simulated groundwater flow and are not representative of solute transport as they do not take into account mechanisms such as sorption, reduction, oxidation, degradation, etc.

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NEEDLES, CALIFORNIA
MODELING APPENDIX

SIMULATED SUBSURFACE GROUNDWATER FLOW AND PATHLINES MODEL LAYER 4 - NTH IRZ OFF

ARCADIS

FIGURE
4B

Attachment S: RTC #25, #357a/b, #358, #359, #360, #361, #362, #364a/b, #365, #366, #367a/b, #368, #369, #370, #371, #382, #384a/b, #385, #386, #388a/b, #391, #392, #393, #394, #398, #401, #402, #403a/b, #404, #405, #406

Tribes' Key Concerns Related to Modeling in the 60% BOD

HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

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April 7, 2014

VIA ELECTRONIC MAIL

Mr. Aaron Yue, Topock Project Manager
DEPARTMENT OF TOXIC SUBSTANCES CONTROL
5796 Corporate Avenue
Cypress, California 90630

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: FMIT comments on modeling issues related to the 60% BOD Report for the PG&E Topock Compressor Station

Dear Mr. Yue and Ms. Innis:

Hargis + Associates, Inc., at the request of its client, the Fort Mojave Indian Tribe ("FMIT" or "the Tribe") is herewith forwarding the enclosed comments and recommendations received from the Topock Technical Review Committee ("TRC") regarding concerns related to modeling performed in support of the 60% Basis of Design ("BOD") Report for the Pacific Gas & Electric, Company ("PG&E") Topock Compressor Station groundwater remedy.

As you may be aware, the Tribe relied heavily on the TRC's technical expertise in numerical modeling in preparing its comments on the 60% BOD Report. The enclosed comments from the TRC represent a summary of subsequent discussions arising from the Technical Working Group ("TWG") meetings, remaining concerns, and proposed recommendations for resolution at the forthcoming 90% BOD stage. The Tribe supports this analysis by the TRC and is forwarding the technical memorandum for inclusion in the 60% BOD Report Response to Comments (RTC).

However, the Tribe would like to add a few edits to the comments for the purposes of clarification. These are as follow:

- p. 1, 2nd to last paragraph – The Tribe wants to make clear that "… all remaining 60% BOD comments …," refers to only the resolution of outstanding *modeling* comments, not *all* comments and issues that the Tribe has raised in regard to the entire 60% BOD.

Other Offices:
Mesa, AZ
San Diego, CA

- p. 4, at the 3rd bullet – There are a few typos including an extra "the" after PG&E in the first line, and there should be a "c)" before "chemical reactions."
- p. 7 – The Tribe wants to make it clear that the bolded text refers to the attainment of RAO *as presently stated*. In other words, the Tribe leaves open the option for "improving" the RAOs.

Please contact me or Ms. Nora McDowell if you have questions concerning this submittal.

Sincerely,

HARGIS + ASSOCIATES, INC.

Leo S. Leonhart

Leo S. Leonhart, PhD, PG
Principal Hydrogeologist

Enclosure

cc w/encl:

C. Coyle
S. McDonald
N. McDowell
Y. Meeks
L. Otero
T. Williams
Tribal Representatives
TRC Members

839.07 Modeling RTC

Integrated Hydro Systems, LLC

Thursday, April 3, 2014

To: Topock Tribal Representatives, TRC Members

From: Bob Prucha, TRC

Subject: Overview of Key Concerns Related to Modeling in the 60% BOD and Recommendations for Comment Resolution

Overview

I reviewed the PG&E April 2013 60% BOD Report, focusing primarily on the modeling section (Appendix B) but also Section 3 and the Executive Summary. I focused my comments primarily on the numerical modeling as it relates to the proposed system design and operation. My comments generally fell into the following categories:

- Modeling Objectives
- Model Sensitivity Analysis/Calibration
- Model Prediction Uncertainty
- Model Optimization
- Possible Effects of High TDS/Density on Remedial Performance

Though the majority of comments were resolved through the RTC process, many remain unresolved. Based on things learned going through the RTC process (i.e., original 60% BOD review/comments and subsequent discussions in TWG meetings, in phone calls, emails, and iterations on RTC tables), I identified two main issues, related to uncertain model predictions about the length of time needed to clean up the plume so the remediation system can be removed. I believe these issues could be resolved if PG&E follows these two recommendations:

a) The 90% BOD Report should include a plan detailing specific data that will be collected **<u>during remedy installation and commissioning</u>** (such as hydraulic testing), specific details on how these data will be used to update and re-calibrate the model, and what scenarios would be re-run. This important data set would be critical to assessing the preliminary design/operation assumptions and allow for adjustments to operational parameters.

b) The 90% BOD Report should also present a detailed plan on how the models (i.e., flow, fate/transport, geochemical) will be updated, re-calibrated, and which scenarios are re-run **<u>during operation</u>**, including adjustments to the operations over time. More details are needed on the proposed basis for triggering when models are updated, and that any operational adjustments improve system performance towards meeting both short- and long-term RAOs.

If such plans and details are developed by PG&E, for example in the 90% BOD Report, all remaining unresolved 60% BOD comments could simply point to these plans in the RTC tables. To date, it has not been possible to adequately address these larger concerns and recommendations in a single RTC comment. I believe detailed plans to update and utilize the numerical models in an ongoing fashion, for example when adjustments to the operation are made, would greatly help reduce potential negative surprises in the currently proposed (60% BOD) remediation system and operation, much of which was designed and developed using these important modeling tools. This should benefit all stakeholders.

I first provide general concerns and recommendations related to each of the modeling areas above, and then summarize the two main issues and recommendations in the last section of this Memo.

Proposed Comment Resolution – by Category

Modeling Objectives

Associated Comments:

25, 367a, 388a, 388b, 391, 402, 404,

For standard modeling projects, modeling objectives must be stated as clearly and unambiguously as possible, because this strongly influences exactly how models are set up, what simulations are needed, and how accurate results must be.

General Concerns:

In my review, I found that modeling objectives as stated in Appendix B appear inconsistent with the broader objectives of the Remedial Action Objectives (RAOs) as outlined in the body of the report. For example:

RAOs (stated in Executive Summary) include:

1) ***Prevent ingestion of groundwater*** as a potable water source having Cr(VI) in excess of the regional background concentration of 32 µg/L.
2) ***Prevent or minimize migration*** of total chromium (Cr[T]) and Cr(VI) in groundwater to ensure concentrations in surface water do not exceed water quality standards that support the designated beneficial uses of the Colorado River (11 µg/L Cr[VI]).
3) ***Reduce the mass of Cr(T) and Cr(VI) in groundwater*** at the site to achieve compliance with the applicable or relevant and appropriate requirements (ARARs) in groundwater. This RAO will be achieved through the cleanup goal of the regional background concentration of 32 µg/L of Cr(VI).
4) Ensure that the geographic location of the ***target remediation area does not permanently expand*** following completion of the remedial action.

Modeling Objectives (Stated in Appendix B of the 60% BOD Report):

The objectives of this modeling study were to develop a groundwater flow and solute transport model for use as follows:

1) **evaluate** subsurface flow conditions
2) **evaluate** the fate and transport of Cr(VI)
3) **evaluate** fate and transport of manganese and arsenic
4) **evaluate** potential remedial system configurations

It appears as though the objectives of the 60% BOD Report modeling were to only 'evaluate' flow, fate/transport and remedial system configurations. However, for a 60% Design and Operation Plan – I was expecting the modeling objectives to clearly state how the model would be used to:

a) Determine 'optimum' well layout (locations, spacing, total depths, screened zones) to meet RAO objectives;
b) Define operations necessary (injection/extraction flow rates, organic carbon injection locations and rates etc.) to meet RAO objectives;
c) Identify procedures to optimize the long-term operation of the system;
d) Determine where additional remediation wells could go;
e) Optimize the IM-3 decommissioning and startup of the new remediation system to minimize negative impacts to the system (to meet RAO objectives);
f) Determine a range of impacts due to manganese and arsenic by product generation.

PG&E's 60% BOD Report (Page 3, App B.) indicates that the modeling tool(s) represent the most important guide for the design and operation of the proposed remediation system: "*For the Site, the conceptual model forms the single most important guide for the design and operation of the proposed remediation system, as it is the basis for the numeric modeling, comprised of groundwater flow and contaminant fate and transport that simulate the operation of the remediation system.*"

In my experience, a primary reason for 'failure' of models (i.e., poor predictions) is poor definition of modeling objectives. The objectives stated in the 60% BOD Report seem to point to a fundamental problem with the overall strategy for using the modeling tool(s):

a) Objectives were vague and unclear. For example, which objective is the most important, or which provides the greatest constraints on model optimizations?

b) A standard methodology in developing/applying/testing/validating the models or considering uncertainty was not presented. Some standard methodologies are mentioned (i.e., American Standards Testing Methods – ASTM), but a clearly-organized modeling method, based on clearly-defined objectives, is not provided.

c) A clear plan was not presented for how this primary design tool will be updated or used during and following system installation, during which a substantial amount of new data in key areas will be collected in a short period of time. Discussions with Arcadis and CH2MHill modelers seemed to confirm that limited consideration has been given to the following:

   a. How will modeling tool(s) be re-calibrated with new data obtained during initial installation, and shaped by additional data obtained over the long-term?

   b. How will the newly re-calibrated model be used to assess the final (100% BOD Report predictions?

   c. How will the newly re-calibrated model be used to modify things like well locations, depths, pumping rates etc. prior to completing the initial installation?

   d. How will the newly re-calibrated model be used to assess the location and design of potential provisional wells, or modify groundwater pumping and/or TOC injection rates?

Recommendations

1) Though not much can be done in the 60% BOD Report, all modeling objectives that have been attained should be clearly defined.

2) Objectives and scope of work should be clearly defined in the 90% BOD Report for all modeling to be conducted during installation, startup and long-term operation (this is described more in the last section of this memo).

Model Prediction Uncertainty

Associated Comments:

359, 370, 371, 382, 385, 388a, 388b, 392, 394, 401, 402, 404, 405, 406

General Problem:

- Uncertainty related to model predictions was not adequately addressed in the 60% BOD Report. A standard, comprehensive uncertainty analysis was not conducted, and an uncertainty analysis was confused with a sensitivity analysis. Though, this would have been challenging to perform, given the complexity of their models, it should have been considered at some level, and discussed in a standard fashion, given the scale and complexity of the design and operation, and overall investment by all stakeholders. I've worked on other projects, where the modeling is quite complicated, but modeling teams have used standard approaches/methodologies to both evaluate and convey uncertainty in design/operation. During discussions, the PG&E consultants indicated that they believe enough 'flexibility' has been built into the system design and operation to account for the effects of any uncertainties.

- The model is the primary tool used to design the remediation system; well locations, depths, screened zones, pumping rates, injected organic carbon, etc., are each and all based on the model. As a result, the design of these components and their operation are uncertain. The consultants (Arcadis/CH2MHill) acknowledge the lack of an uncertainty analysis and the uncertainty in the design, but simply assumed, based on 'professional judgment', a certain amount of 'flexibility' to account for this uncertainty (i.e., additional, contingent wells, and a range of possible flow rates at each well, among others). Changes in the original design and operation at Hinkley represent an example of what happens when incorrect assumptions, or guesses are made. If they don't have enough flexibility built into the system design/operation, they will need more wells, or the system may operate for 50 years or even longer to meet RAO objectives.

- The modeling conducted by PG&E the consultants simulates three things: a) water flow; b) transport/reaction of chemical species; and, geochemical reactions. It is standard engineering (and modeling) practice to provide an estimate of uncertainty with any modeling predictions, and this seems especially warranted in this instance given the overall costs and complexity of this system design and operation.

- The modelers were uncertain how long it would take to remediate the Cr(VI) concentrations to meet RAO objectives. The range seemed to be from 30 years, to even 200+ years in discussions. This is probably one of the most important issues identified during my review.

Recommendations

a) Although the 60% BOD is complete, the 90% BOD should include further evaluation and discussion on the uncertainty in model predictions associated with:

a. The length of time the system will need to operate to meet objectives of the remediation system.
b. The placement of wells, well screens, total depths. How confident is PG&E that the placement of proposed wells, including contingent wells, is adequate to meet objectives?
c. The number of wells required. How confident is PG&E that the proposed maximum number of wells is adequate to meet objectives? How confident are they that they haven't proposed too many wells?
d. Operational factors (flow rates, water quality, TOC inputs etc.). What is the confidence in the combination of proposed well #/locations and operational ranges (i.e., pumping rates) will be sufficient to meet remedial objectives?

b) Determine implications of predictive uncertainty on the proposed design and operation. Some sort of assessment could be provided in the 90% BOD Report.

c) The 90% BOD should consider the benefits of a phased installation and testing plan. Data obtained from early well drilling and testing could be fed back into the model and adjustments to the final BOD could be made before the entire system is installed and begins operating.

Model Sensitivity Analysis/Calibration

Associated Comments:

360, 361, 362

General Problems:

- Two types of sensitivity analyses are typically conducted; calibration and prediction. A calibration sensitivity analysis attempts to identify and rank the most important factors to which groundwater flow is most sensitive. Prediction sensitivity analyses assess sensitivity of model predictions to variations of important model parameters. No distinction was made in the 60% BOD Report about which type of analysis was performed, and the sensitivity analysis was confused with a standard uncertainty analysis.

- The consultants did not test the sensitivity of groundwater flow/heads to all factors, or combinations of factors. Instead, they showed the sensitivity of predicted groundwater conditions to adjustments of only a select set of parameters. In addition, they failed to demonstrate that groundwater flow or water quality predictions were most sensitive to the selected parameter set. The parameter adjustments evaluated did not seem to cover a realistic range based on reported field observations. So, sensitivity predictions don't really convey a realistic range of what might occur upon actually startup and commissioning of the remediation system.

- The model has many factors (r 'knobs' that can be adjusted to change the operation of the system). Once operating, any changes to the system will certainly have the potential to change long-term performance of the system regarding achieving RAOs. Without conducting a comprehensive evaluation of key flow and fate/transport parameters (or boundary conditions), PG&E will likely experience the following during operation because of the limited sensitivity analysis they conducted:

    - Problems in determining which of the many factors (model inputs) that affect the performance of the remediation system should be adjusted (in priority) to meet long-term RAOs (optimally);

    - Not knowing how much to adjust these factors to meet long-term RAOs.

Recommendations:

A list of all model parameters and input should be prepared. These model parameters should be ranked based on the sensitivity of groundwater flows and water quality transport sensitivity to them. This will help operators better understand which 'knob' to adjust, by how much, and what the system response might be. Such a list should be refined as new data is obtained during installation and operation. Failure to maintain such a list and the model, could result in reduced performance of the system towards achieving RAOs.

Model Optimization

Associated Comments:

358, 364a, 364b, 365, 366, 367a, 367b, 368, 369, 386, 388a, 388b, 393, 398, 403a, 403b

General Concerns:

- The modelers mention optimization many times, but this was not described well, nor did it constitute a formal engineering optimization to support the proposed design of this type of complex, large, long-term remediation system. A clear optimization strategy was never presented in the 60% BOD, describing appropriate performance targets and metrics. I attribute much of this to the very poorly/vaguely defined modeling objectives.

- Though the consultants claim the proposed remediation design/operation were ‘optimized’, this was never adequately demonstrated in the document (i.e., describing/showing multiple simulations aimed at ‘optimizing’ key targets.)

- No performance metrics were really defined to optimize the system. They show current proposed well locations, screened intervals, pumping rates, TOC injection rates etc., but also show that complete reduction of Cr(VI) can take 50+ years. **The design and operation, even if uncertain, should be based on a performance target of achieving RAOs within 30 years, or less.** The modeling conducted here appears more like an evaluation of a conceptual design (and operation), than an actual basis for an engineering design and operation document at 60%.

Recommendations

A clear methodology should be presented on how the modeling tool(s) will be used in conjunction with installation and subsequent hydraulic testing to optimize or refine fixed design features (i.e., well placement, screened zones etc.) that can’t be changed once installed.

A clear methodology should be presented on how the primary design tool will be used to optimize/refine operational factors (i.e., pumping rates, TOC injection rates etc.) Show explicitly how and when modeling tools (flow, transport and geochemical) will be updated, with what data, and how and where new model predictions will be used in these operational schematics (see Figures 2.2-2 through 2.2-9 in Appendix L).

Possible Effects of High TDS/Density on Remedial Performance

Associated Comments:

357a, 357b, 384a, 384b

General Problems

- Contrasts in water density (fresh water and denser, 'saltier' water) can affect system performance. When fresh, lighter water is injected into denser water, depending on a number of factors, the difference in densities can cause lighter water to float on top of the denser water due to buoyancy. As a result, this can limit the ability of freshwater injection wells to fully flush water through denser water zones (lower in aquifer, because dense water sinks).

- Two issues with simply assuming this won't be a problem are:

  - A detailed plan describing exactly how they will actually confirm whether water densities are causing a problem was not provided.

  - Without knowing if density contrasts are a problem at a given location, incorrect 'knobs' could be adjusted the wrong amount, or the wrong way, thereby reducing the performance of the remediation system in achieving RAOs.

Recommendations

In the 90% BOD:

1) The possibility of density contrasts affecting performance should be acknowledged, even though this may not be highly likely in most wells.

2) Discuss what can be monitored to confirm this will or won't be a problem.

3) Finally, if it is determined to be a problem (i.e., poor flushing at depth due to buoyant 'bypass') – A plan should be developed, describing what will be done to 'adjust' the problem within current proposed design and operational constraints.

Key Issues and Recommendations

Installation, Startup, Long-term Operation and Use of Modeling

General Concerns

Through various discussions with PG&E consultants (Arcadis and CH2MHill), mostly during TWG meetings and phone meetings to discuss modeling comments, I've identified two additional concerns:

1) When PG&E installs the system, a large amount of new data will be collected in key areas.

Problems:

a) Aracadis and CH2MHill did not appear to concur with each other on the type, or level of hydraulic testing to be conducted as a part of well installation and commissioning.

b) I saw no detailed plan on what hydraulic testing would be done as the system is installed. These details are not covered in Appendix L (Operations and Maintenance), which focus on groundwater monitoring, but not testing. Nor is anything presented in Appendix L on future modeling details with the exception of very vague text related to their Adaptive Operations Approach – Section 1.2.2) which Arcadis has referenced in response to my comments. Given the limitations on number and location of proposed remedial wells, it makes sense to conduct hydraulic tests on all wells <u>as they are installed</u>, or even better on groups of wells in localized areas to identify problem wells and develop mitigation plans. Having done this, there is a greater likelihood that the original model predictions (which are uncertain – see discussion on the lack of uncertainty analysis) will still be valid and still allow the system to perform, within the somewhat arbitrary 'flexible' ranges assumed by modelers, without having to add more wells. Testing could also suggest that fewer wells are needed than originally planned in the Final BoD Report. Either way, as new test results are used to update the model, the model can then be used to improve initial startup and operational factors to minimize potential negative impacts upon startup. Incorrect adjustments may not only increase cleanup times, but can potentially exacerbate the existing problem.

c) In discussions, consultants appeared to lack concurrence on how, or even whether the model would be used during installation, or afterward the remedy commences operation. The model's proposed use during installation and operation does not appear to have been well thought out. This is surprising because the model is clearly the primary tool used to design the remediation well layout (i.e., pumping/injection well locations, depths, screened intervals, pumping rates, TOC injection locations, timing and rates/cycles etc.). Given the lack of any formal analysis of uncertainty in model predictions, or an adequate sense of which factors to adjust and by how much (i.e., limited sensitivity analysis) to meet long-term performance metrics (RAOs), all new data should be used to update the model during construction, re-calibrate it to be consistent with hydraulic test results obtained during well installation, and to re-run long-term simulations of proposed operations to assess whether the 100% design needs any modifications. The installation period, when drilling rigs are mobilized and on-site is the best time to adjust the 100% design (i.e., well locations, well numbers, well depths, etc).

2) Once the system is running, Arcadis indicated that they will rely mostly on observation data as a basis for making any adjustments to the remediation system and its operation.

Problems:

a) Where and when model updates are discussed, the basis and specific approach for the updating is vague. For example, in response to comment #360, Arcadis states "*The groundwater flow and solute transport model will be updated and recalibrated if significant differences from the conceptual site model are encountered with respect to hydrogeologic characterization or remedy performance. This will allow the model to be used as a tool to evaluate the performance and guide the operation of the remedial design after including the adjusted data.*"

I don't believe the consultants have defined the conceptual flow and transport model well enough to know when 'significant' differences would be encountered. The entire system design and operation has been designed based on model simulations, which they also admit are uncertain, and the model was only tested in a limited fashion (i.e., limited sensitivity analyses), and wasn't really optimized in a standard engineering way. I am convinced that the model remains the only tool available to assess how any changes to model inputs will affect long-term system performance. I also believe that without updating these modeling tools constantly, and especially early in the installation and operational phases, it will be difficult for them to convince the Tribes (and other stakeholders, as well as the owner) that the current, complicated operational cycling/injection/extraction system will reduce Cr(VI) concentrations, plume size, and by-product development within the 30 year time frame.

b) It is clear that many 'knobs' can be adjusted in the proposed remediation system operation, for either the new wells or to replacement and contingency wells that may be added over time. Information learned at the Hinkley Site indicates significant problems resulted when the plume bypassed a portion of the initial proposed well network, moving between wells, and on the sides and below the well network. The limited sensitivity analysis Arcadis conducted for Topock gives little confidence they will adjust the right 'knobs', and by how much (in the right direction, magnitude and priority) to 'optimize' system performance to meet long-term (decades) RAO remediation objectives. Arcadis has argued that observation data will be the primary information used to guide any changes to the remediation system and its operation. Although observation data will certainly be useful in assessing **current** system performance, for guiding appropriate adjustment of the right 'knobs' to meet long-term objectives, the model must be updated and improved (calibrated) systematically, using the observation data. This is especially true given the proposed long cycles of on/off TOC injections.

c) The consultants have provided no detailed plan on how and when they will update the model, what simulations they'd run, or generally how they'd use the modeling along with observation data to help optimize system performance (i.e., achieve overall objectives most efficiently, such as minimizing overall remediation time, byproducts etc.).

Recommendations

During Installation:

1) Develop a plan that includes the following:

    a. Conduct hydraulic tests during installation for all wells, to confirm that well locations, depths, screened zones, productivity and drawdowns are within the proposed operational range. Through discussions with Arcadis and CH2MHill, this operational range was apparently determined 'through professional' judgment and not via a formal uncertainty analyses. This is fine, but this should be thoroughly tested **<u>during the initial phases of well installation</u>,** so that adjustments could be made before finalizing the entire installation and finding out that the system doesn't perform as expected (or predicted by the model(s)).

    b. A plan should be developed to update, re-calibrate and re-run short- and long-term model scenarios to confirm that the proposed design and operation are within the largely assumed ranges of performance and will still meet RAOs. Given the expected duration for installation, the model(s) could be continuously updated and used to confirm performance in specific areas.

    c. Results should be provided on all model updates and simulations to the Tribes and all stakeholders.

During Operation:

1) A plan should be developed showing a more realistic basis for when the model(s) will be updated. I believe model(s) should be updated every TOC on/off injections cycle, at least for the first few years, when the most significant changes to the existing system will occur. When changes in operation are made, for example, to TOC injection rates, locations, depths, timing, or injection/extraction well flow rates, the model(s) should be updated.

2) In the plan, discuss how the model(s) will be updated, and also re-calibrated against newly acquired 'operational' flow and water quality data , and how long-term simulations will be re-run to evaluate and confirm that long-term projections don't deviate from what is proposed in the 60%BOD Report (which is actually unclear) towards achieving RAOs.

3) Every time the model(s) are updated, re-calibrated and long-term simulations re-run, results should be documented and submitted to stakeholders.

THE SOVEREIGN NATION OF THE COCOPAHS

Xawitt Kwñchawaay

THE COCOPAH INDIAN TRIBE

Cultural Resource Department
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Project Number: CCR-032-06-001

Via Electronic Mail

Mr. Aaron Yue
Topock Project Manager
California Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630

April 9, 2014

Ms. Pamela S. Innis
Topock Remedial Project Manager
Office of Environmental Policy and Compliance
U.S. DEPARTMENT OF THE INTERIOR
P.O. Box 25007 (D-108)
Denver, Colorado 80225-007

Re: Comments on Modeling Issues related to the 60% BOD Report for the PG&E Topock Compressor Station

Dear Mr. Yue and Ms. Innis:

Attached to this letter you will find comments prepared by the TRC regarding key concerns related to modeling in the 60% BOD. If you have any questions feel free to contact me at: Cell: 928-287-5042 or by email at CocopahTPM@gmail.com

Thank you

Edgar Castillo

Edgar Castillo
Cocopah Indian Tribe
Topock Project Manager

Cc:
Tribal Representatives
Yvonne Meeks
TRC Members

Integrated Hydro Systems, LLC

Thursday, April 3, 2014

To: Topock Tribal Representatives, TRC Members

From: Bob Prucha, TRC

Subject: Overview of Key Concerns Related to Modeling in the 60% BOD and Recommendations for Comment Resolution

Overview

I reviewed the PG&E April 2013 60% BOD Report, focusing primarily on the modeling section (Appendix B) but also Section 3 and the Executive Summary. I focused my comments primarily on the numerical modeling as it relates to the proposed system design and operation. My comments generally fell into the following categories:

- Modeling Objectives
- Model Sensitivity Analysis/Calibration
- Model Prediction Uncertainty
- Model Optimization
- Possible Effects of High TDS/Density on Remedial Performance

Though the majority of comments were resolved through the RTC process, many remain unresolved. Based on things learned going through the RTC process (i.e., original 60% BOD review/comments and subsequent discussions in TWG meetings, in phone calls, emails, and iterations on RTC tables), I identified two main issues, related to uncertain model predictions about the length of time needed to clean up the plume so the remediation system can be removed. I believe these issues could be resolved if PG&E follows these two recommendations:

a) The 90% BOD Report should include a plan detailing specific data that will be collected **during remedy installation and commissioning** (such as hydraulic testing), specific details on how these data will be used to update and re-calibrate the model, and what scenarios would be re-run. This important data set would be critical to assessing the preliminary design/operation assumptions and allow for adjustments to operational parameters.

b) The 90% BOD Report should also present a detailed plan on how the models (i.e., flow, fate/transport, geochemical) will be updated, re-calibrated, and which scenarios are re-run **during operation**, including adjustments to the operations over time. More details are needed on the proposed basis for triggering when models are updated, and that any operational adjustments improve system performance towards meeting both short- and long-term RAOs.

If such plans and details are developed by PG&E, for example in the 90% BOD Report, all remaining unresolved 60% BOD comments could simply point to these plans in the RTC tables. To date, it has not been possible to adequately address these larger concerns and recommendations in a single RTC comment. I believe detailed plans to update and utilize the numerical models in an ongoing fashion, for example when adjustments to the operation are made, would greatly help reduce potential negative surprises in the currently proposed (60% BOD) remediation system and operation, much of which was designed and developed using these important modeling tools. This should benefit all stakeholders.

I first provide general concerns and recommendations related to each of the modeling areas above, and then summarize the two main issues and recommendations in the last section of this Memo.

Proposed Comment Resolution – by Category

Modeling Objectives

Associated Comments:

25, 367a, 388a, 388b, 391, 402, 404,

For standard modeling projects, modeling objectives must be stated as clearly and unambiguously as possible, because this strongly influences exactly how models are set up, what simulations are needed, and how accurate results must be.

General Concerns:

In my review, I found that modeling objectives as stated in Appendix B appear inconsistent with the broader objectives of the Remedial Action Objectives (RAOs) as outlined in the body of the report. For example:

RAOs (stated in Executive Summary) include:

1) ***Prevent ingestion of groundwater*** as a potable water source having Cr(VI) in excess of the regional background concentration of 32 µg/L.
2) ***Prevent or minimize migration*** of total chromium (Cr[T]) and Cr(VI) in groundwater to ensure concentrations in surface water do not exceed water quality standards that support the designated beneficial uses of the Colorado River (11 µg/L Cr[VI]).
3) ***Reduce the mass of Cr(T) and Cr(VI) in groundwater*** at the site to achieve compliance with the applicable or relevant and appropriate requirements (ARARs) in groundwater. This RAO will be achieved through the cleanup goal of the regional background concentration of 32 µg/L of Cr(VI).
4) Ensure that the geographic location of the ***target remediation area does not permanently expand*** following completion of the remedial action.

Modeling Objectives (Stated in Appendix B of the 60% BOD Report):

The objectives of this modeling study were to develop a groundwater flow and solute transport model for use as follows:

1) **evaluate** subsurface flow conditions
2) **evaluate** the fate and transport of Cr(VI)
3) **evaluate** fate and transport of manganese and arsenic
4) **evaluate** potential remedial system configurations

It appears as though the objectives of the 60% BOD Report modeling were to only 'evaluate' flow, fate/transport and remedial system configurations. However, for a 60% Design and Operation Plan – I was expecting the modeling objectives to clearly state how the model would be used to:

a) Determine 'optimum' well layout (locations, spacing, total depths, screened zones) to meet RAO objectives;
b) Define operations necessary (injection/extraction flow rates, organic carbon injection locations and rates etc.) to meet RAO objectives;
c) Identify procedures to optimize the long-term operation of the system;
d) Determine where additional remediation wells could go;
e) Optimize the IM-3 decommissioning and startup of the new remediation system to minimize negative impacts to the system (to meet RAO objectives);
f) Determine a range of impacts due to manganese and arsenic by product generation.

PG&E's 60% BOD Report (Page 3, App B.) indicates that the modeling tool(s) represent the most important guide for the design and operation of the proposed remediation system: "*For the Site, the conceptual model forms the single most important guide for the design and operation of the proposed remediation system, as it is the basis for the numeric modeling, comprised of groundwater flow and contaminant fate and transport that simulate the operation of the remediation system*."

In my experience, a primary reason for 'failure' of models (i.e., poor predictions) is poor definition of modeling objectives. The objectives stated in the 60% BOD Report seem to point to a fundamental problem with the overall strategy for using the modeling tool(s):

a) Objectives were vague and unclear. For example, which objective is the most important, or which provides the greatest constraints on model optimizations?

b) A standard methodology in developing/applying/testing/validating the models or considering uncertainty was not presented. Some standard methodologies are mentioned (i.e., American Standards Testing Methods – ASTM), but a clearly-organized modeling method, based on clearly-defined objectives, is not provided.

c) A clear plan was not presented for how this primary design tool will be updated or used during and following system installation, during which a substantial amount of new data in key areas will be collected in a short period of time. Discussions with Arcadis and CH2MHill modelers seemed to confirm that limited consideration has been given to the following:

    a. How will modeling tool(s) be re-calibrated with new data obtained during initial installation, and shaped by additional data obtained over the long-term?
    b. How will the newly re-calibrated model be used to assess the final (100% BOD Report predictions?
    c. How will the newly re-calibrated model be used to modify things like well locations, depths, pumping rates etc. prior to completing the initial installation?
    d. How will the newly re-calibrated model be used to assess the location and design of potential provisional wells, or modify groundwater pumping and/or TOC injection rates?

Recommendations

1) Though not much can be done in the 60% BOD Report, all modeling objectives that have been attained should be clearly defined.

2) Objectives and scope of work should be clearly defined in the 90% BOD Report for all modeling to be conducted during installation, startup and long-term operation (this is described more in the last section of this memo).

Model Prediction Uncertainty

Associated Comments:

359, 370, 371, 382, 385, 388a, 388b, 392, 394, 401, 402, 404, 405, 406

General Problem:

- Uncertainty related to model predictions was not adequately addressed in the 60% BOD Report. A standard, comprehensive uncertainty analysis was not conducted, and an uncertainty analysis was confused with a sensitivity analysis. Though, this would have been challenging to perform, given the complexity of their models, it should have been considered at some level, and discussed in a standard fashion, given the scale and complexity of the design and operation, and overall investment by all stakeholders. I've worked on other projects, where the modeling is quite complicated, but modeling teams have used standard approaches/methodologies to both evaluate and convey uncertainty in design/operation. During discussions, the PG&E consultants indicated that they believe enough 'flexibility' has been built into the system design and operation to account for the effects of any uncertainties.

- The model is the primary tool used to design the remediation system; well locations, depths, screened zones, pumping rates, injected organic carbon, etc., are each and all based on the model. As a result, the design of these components and their operation are uncertain. The consultants (Arcadis/CH2MHill) acknowledge the lack of an uncertainty analysis and the uncertainty in the design, but simply assumed, based on 'professional judgment', a certain amount of 'flexibility' to account for this uncertainty (i.e., additional, contingent wells, and a range of possible flow rates at each well, among others). Changes in the original design and operation at Hinkley represent an example of what happens when incorrect assumptions, or guesses are made. If they don't have enough flexibility built into the system design/operation, they will need more wells, or the system may operate for 50 years or even longer to meet RAO objectives.

- The modeling conducted by PG&E the consultants simulates three things: a) water flow; b) transport/reaction of chemical species; and, geochemical reactions. It is standard engineering (and modeling) practice to provide an estimate of uncertainty with any modeling predictions, and this seems especially warranted in this instance given the overall costs and complexity of this system design and operation.

- The modelers were uncertain how long it would take to remediate the Cr(VI) concentrations to meet RAO objectives. The range seemed to be from 30 years, to even 200+ years in discussions. This is probably one of the most important issues identified during my review.

Recommendations

a) Although the 60% BOD is complete, the 90% BOD should include further evaluation and discussion on the uncertainty in model predictions associated with:

a. The length of time the system will need to operate to meet objectives of the remediation system.
b. The placement of wells, well screens, total depths. How confident is PG&E that the placement of proposed wells, including contingent wells, is adequate to meet objectives?
c. The number of wells required. How confident is PG&E that the proposed maximum number of wells is adequate to meet objectives? How confident are they that they haven't proposed too many wells?
d. Operational factors (flow rates, water quality, TOC inputs etc.). What is the confidence in the combination of proposed well #/locations and operational ranges (i.e., pumping rates) will be sufficient to meet remedial objectives?

b) Determine implications of predictive uncertainty on the proposed design and operation. Some sort of assessment could be provided in the 90% BOD Report.

c) The 90% BOD should consider the benefits of a phased installation and testing plan. Data obtained from early well drilling and testing could be fed back into the model and adjustments to the final BOD could be made before the entire system is installed and begins operating.

Model Sensitivity Analysis/Calibration

Associated Comments:

360, 361, 362

General Problems:

- Two types of sensitivity analyses are typically conducted; calibration and prediction. A calibration sensitivity analysis attempts to identify and rank the most important factors to which groundwater flow is most sensitive. Prediction sensitivity analyses assess sensitivity of model predictions to variations of important model parameters. No distinction was made in the 60% BOD Report about which type of analysis was performed, and the sensitivity analysis was confused with a standard uncertainty analysis.

- The consultants did not test the sensitivity of groundwater flow/heads to all factors, or combinations of factors. Instead, they showed the sensitivity of predicted groundwater conditions to adjustments of only a select set of parameters. In addition, they failed to demonstrate that groundwater flow or water quality predictions were most sensitive to the selected parameter set. The parameter adjustments evaluated did not seem to cover a realistic range based on reported field observations. So, sensitivity predictions don't really convey a realistic range of what might occur upon actually startup and commissioning of the remediation system.

- The model has many factors (r 'knobs' that can be adjusted to change the operation of the system). Once operating, any changes to the system will certainly have the potential to change long-term performance of the system regarding achieving RAOs. Without conducting a comprehensive evaluation of key flow and fate/transport parameters (or boundary conditions), PG&E will likely experience the following during operation because of the limited sensitivity analysis they conducted:

    - Problems in determining which of the many factors (model inputs) that affect the performance of the remediation system should be adjusted (in priority) to meet long-term RAOs (optimally);

    - Not knowing how much to adjust these factors to meet long-term RAOs.

Recommendations:

A list of all model parameters and input should be prepared. These model parameters should be ranked based on the sensitivity of groundwater flows and water quality transport sensitivity to them. This will help operators better understand which 'knob' to adjust, by how much, and what the system response might be. Such a list should be refined as new data is obtained during installation and operation. Failure to maintain such a list and the model, could result in reduced performance of the system towards achieving RAOs.

Model Optimization

Associated Comments:

358, 364a, 364b, 365, 366, 367a, 367b, 368, 369, 386, 388a, 388b, 393, 398, 403a, 403b

General Concerns:

- The modelers mention optimization many times, but this was not described well, nor did it constitute a formal engineering optimization to support the proposed design of this type of complex, large, long-term remediation system. A clear optimization strategy was never presented in the 60% BOD, describing appropriate performance targets and metrics. I attribute much of this to the very poorly/vaguely defined modeling objectives.

- Though the consultants claim the proposed remediation design/operation were 'optimized', this was never adequately demonstrated in the document (i.e., describing/showing multiple simulations aimed at 'optimizing' key targets.)

- No performance metrics were really defined to optimize the system. They show current proposed well locations, screened intervals, pumping rates, TOC injection rates etc., but also show that complete reduction of Cr(VI) can take 50+ years. **The design and operation, even if uncertain, should be based on a performance target of achieving RAOs within 30 years, or less.** The modeling conducted here appears more like an evaluation of a conceptual design (and operation), than an actual basis for an engineering design and operation document at 60%.

Recommendations

A clear methodology should be presented on how the modeling tool(s) will be used in conjunction with installation and subsequent hydraulic testing to optimize or refine fixed design features (i.e., well placement, screened zones etc.) that can't be changed once installed.

A clear methodology should be presented on how the primary design tool will be used to optimize/refine operational factors (i.e., pumping rates, TOC injection rates etc.) Show explicitly how and when modeling tools (flow, transport and geochemical) will be updated, with what data, and how and where new model predictions will be used in these operational schematics (see Figures 2.2-2 through 2.2-9 in Appendix L).

Possible Effects of High TDS/Density on Remedial Performance

Associated Comments:

357a, 357b, 384a, 384b

General Problems

- Contrasts in water density (fresh water and denser, 'saltier' water) can affect system performance. When fresh, lighter water is injected into denser water, depending on a number of factors, the difference in densities can cause lighter water to float on top of the denser water due to buoyancy. As a result, this can limit the ability of freshwater injection wells to fully flush water through denser water zones (lower in aquifer, because dense water sinks).

- Two issues with simply assuming this won't be a problem are:

    - A detailed plan describing exactly how they will actually confirm whether water densities are causing a problem was not provided.

    - Without knowing if density contrasts are a problem at a given location, incorrect 'knobs' could be adjusted the wrong amount, or the wrong way, thereby reducing the performance of the remediation system in achieving RAOs.

Recommendations

In the 90% BOD:

1) The possibility of density contrasts affecting performance should be acknowledged, even though this may not be highly likely in most wells.

2) Discuss what can be monitored to confirm this will or won't be a problem.

3) Finally, if it is determined to be a problem (i.e., poor flushing at depth due to buoyant 'bypass') – A plan should be developed, describing what will be done to 'adjust' the problem within current proposed design and operational constraints.

Key Issues and Recommendations

Installation, Startup, Long-term Operation and Use of Modeling

General Concerns

Through various discussions with PG&E consultants (Arcadis and CH2MHill), mostly during TWG meetings and phone meetings to discuss modeling comments, I've identified two additional concerns:

1) When PG&E installs the system, a large amount of new data will be collected in key areas.

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c) The consultants have provided no detailed plan on how and when they will update the model, what simulations they'd run, or generally how they'd use the modeling along with observation data to help optimize system performance (i.e., achieve overall objectives most efficiently, such as minimizing overall remediation time, byproducts etc.).

Recommendations

During Installation:

1) Develop a plan that includes the following:

   a. Conduct hydraulic tests during installation for all wells, to confirm that well locations, depths, screened zones, productivity and drawdowns are within the proposed operational range. Through discussions with Arcadis and CH2MHill, this operational range was apparently determined 'through professional' judgment and not via a formal uncertainty analyses. This is fine, but this should be thoroughly tested **during the initial phases of well installation,** so that adjustments could be made before finalizing the entire installation and finding out that the system doesn't perform as expected (or predicted by the model(s)).

   b. A plan should be developed to update, re-calibrate and re-run short- and long-term model scenarios to confirm that the proposed design and operation are within the largely assumed ranges of performance and will still meet RAOs. Given the expected duration for installation, the model(s) could be continuously updated and used to confirm performance in specific areas.

   c. Results should be provided on all model updates and simulations to the Tribes and all stakeholders.

During Operation:

1) A plan should be developed showing a more realistic basis for when the model(s) will be updated. I believe model(s) should be updated every TOC on/off injections cycle, at least for the first few years, when the most significant changes to the existing system will occur. When changes in operation are made, for example, to TOC injection rates, locations, depths, timing, or injection/extraction well flow rates, the model(s) should be updated.

2) In the plan, discuss how the model(s) will be updated, and also re-calibrated against newly acquired 'operational' flow and water quality data , and how long-term simulations will be re-run to evaluate and confirm that long-term projections don't deviate from what is proposed in the 60%BOD Report (which is actually unclear) towards achieving RAOs.

3) Every time the model(s) are updated, re-calibrated and long-term simulations re-run, results should be documented and submitted to stakeholders.

Attachment T: RTC #6, Narrative on Key Decommissioning Steps

Attachment T

Response to Comment #6 FMIT-1/Hualapai-1/Chemehuevi-1/CRIT-1/Cocopah-1

Comment #6: *A conceptual narrative for the anticipated steps in the decommissioning of this proposed remedy should be included to assist in both evaluating the design elements and how they would impact removal of the remedy infrastructure, and in evaluating the total, cumulative impacts of this project.*

Response to Comment:

Conceptually, the key steps in the decommissioning of remedy facilities may include, but not limited to the following:

- **Site preparation and demarcation** – typical activities include mobilization of resources (personnel, equipment, materials), delineate access/haul routes, demarcate work and support zones including staging areas, and set up temporary facilities. Temporary facilities may include trailers, restroom facilities, safety and security lighting, equipment storage area, and parking area.
- **Utility survey and isolation** – typical activities include locating and marking underground utilities prior to intrusive work, and isolation of identified utilities. Utilities may include water, sewer, gas, phone, and power lines. Underground Service Alert or "Dig Alert" will be contacted to identify public utilities that operate within the work areas. Identified utilities will be isolated and disconnected by the utility provider prior to decommissioning and removing portions of a utility.
- **System components decommissioning** – decommissioning renders the components permanently out of service. Typical activities include decontamination and removal or abandonment in place. Decontamination will involve cleaning and removing waste materials, and render the components appropriate for reuse, recycle, or disposal. After decontamination, the components will be removed or abandoned in place.
- **Waste characterization and management –** waste generated from decommissioning may include liquid wastes, solid wastes, and sludge. Waste will be characterized and managed appropriately.

- **Soil confirmation sampling, as needed** – subsequent to decommissioning and removal, soil confirmation sampling may be conducted to assess soil conditions as needed.
- **Post-decommissioning restoration** – after decommissioning and confirmation sampling are complete, site restoration will commence. Restoration activities will start with returning the land to a safe condition, backfilling of excavated infrastructure, and compacting uneven areas. Light grading and contouring may be required to provide proper drainage and to control erosion. Revegetation will occur after final grading and contouring.

The above conceptual steps apply to pipelines and vertical infrastructure. Decommissioning of wells will be in accordance with the approach outlined in the project Well Decommissioning SOP (Well-SOP-01).

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General Comments									
1	DOI-1	General Comment		The 30% design package meets the substantive requirements of the 2009 Model Consent Decree as shown in Table 8-1. It represents a considerable level of effort.	Comment noted.				
2	DOI-2	General Comment		The Basis of Design (BOD) references the CERCLA Model Remedial Design/Remedial Action (RD/RA) Consent Decree throughout. PG&E and DOI have negotiated a Consent Decree and the document is going through the final approval process. It is DOI's expectation that future design documents reference the final Consent Decree rather than the model.	Comment noted. The final Consent Decree will be referenced when it is available.			Comment resolved.	The Consent Decree executed in 2012 and lodged with the court in January 2013 was referenced throughout this BOD Report.
3	DOI-3	General Comment		The text should identify specific wells by number in the discussions of well extraction and injection. It appears there are inconsistencies in understanding which wells are used for each particular purpose. For example, discussions in the modeling appendix indicate that wells UPGRAD-INJ-3 and -4 will be used for fresh water injection and wells UPGRAD-1 and -2 will be used for injection of carbon-amended water from the riverbank wells. This is not consistent with DOI's understanding, which is that all UPGRAD-INJ wells will be used for carbon-amended water injection. However, it was not possible to verify which wells were being used for what purpose because the discussion in the design basis sections (Section 3 of the main report) does not identify the wells by number, nor do the design drawings resolve this question.	The design and model presented in the 30% design uses UPGRAD-INJ-3 and -4 for fresh water injection and UPGRAD-INJ-1 and -2 for un-amended Riverbank well water. However, Riverbank well water will be amended with carbon if Cr(VI) exceeds 32ug/L, prior to injection into UPGRAD-INJ-1 and -2. In the 60% design the well references will be clarified and be more specific than in the 30% to minimize confusion. It should be noted that alternative injection scenarios involving these injection wells will be considered as part of the 60% design and flexibility has already been designed into the system to accommodate alternative flow scenarios. Additional detail will be included in the 60% design.		Okay pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Section 3.2 and Appendix B of the BOD Report.
4	DOI-4	General Comment		There appear to be some inconsistencies in pipeline cross references between related P&ID drawings. It is recommended that all cross references be verified for the 60% design submittal.	Comment noted. All cross references will be verified for the 60% design submittal.		Okay pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix D of this BOD Report.
5	DOI-5	General Comment		The BOD does not address green and sustainable remediation practices. It is the expectation of DOI that PG&E evaluate the current design and employ strategies for the Topock Remediation Project that uses natural resources and energy efficiently, including the use of renewable energy sources where practical, reduces negative impacts on the environment, minimizes or eliminates pollution at its source, protects and benefits the community at large, and reduces waste to the greatest extent possible. The BOD should include a specific section that references these practices.	The 30% BOD addressed green and sustainable remediation practices in many ways. As requested, the 60% design document will include a separate section to enumerate and discuss application of green and sustainable remediation practices. Examples where the 30% BOD addressed these issues include: **Energy Use** – a) design criteria included energy efficient architectural elements (see Appendix C.7), energy efficient equipment and lighting (see Appendix C.5.2), b) EPANET water supply program was used to design the piping network and minimize energy consumption. **Materials/Recycling/Reuse** – the concepts of reuse, shared use, and recycling of existing facilities and infrastructure were incorporated into the design (e.g., shared		Okay pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Section 4 – Application of Green Remediation Practices of this BOD Report.

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					use of existing storage tanks, repurposing of existing buildings); the concept of using native materials sourced from the site was included in Section 3.5.4 (this will be further detailed in the 60% design as the strategy for handling of displaced materials is further developed by agencies, Tribes, and PG&E); the design criteria included the International Green Building Code (see Appendix C.7). **Protection of Sensitive Resources** – Surveys and mapping are underway to document baseline conditions (e.g., mature plants, vegetation conditions, wetlands delineation, protocol surveys for sensitive bird species); and results have been and will continue to be used to guide the design to protect, avoid, and minimize potential impact to resources. Furthermore, plans such as the bird avoidance and minimization plan are being prepared that will include best management practices for remedy activities. **Waste Minimization** – operational experience with well backwash/ rehabilitation at Topock and the ongoing pilot test of backwash frequency at Hinkley have been and will continue to be incorporated into the design of the remedy produced water management system to minimize waste (see Appendix F). **Water Management** – most water needs for the remedy will be taken from and returned to the target IRZ barrier thereby maintaining the aquifer's net water balance; optimizing recirculation flowrates and careful carbon dosing will minimize generation and migration of by-products, while maintaining the required carbon distribution. **Airborne NOx and SOx, Greenhouse gas emissions, and Airborne particulates** - Careful dosing of carbon will reduce carbon substrate needs and thereby reduce air emissions associated with transportation of materials to the site. In addition, the timeframe for site remediation is reduced through the use of freshwater flushing, which induces a hydraulic gradient that is essential to creating more efficient and effective treatment. Any reduction in treatment time results in reductions to water use, materials use, waste generation, energy use, air emissions generated, health and safety hazards, and adverse effects on biological resources, stakeholders, and local economy.				

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					Furthermore, Table 8-3 lists a host of forthcoming plans and documents including the Access Plan and the Security Plan, as well as signage and information kiosk that are designed to protect public health and safety and to reduce potential damage to environmental resources.				
6	DTSC-GC4	General Comment: Green / Sustainable Remediation		Green Sustainability Factors need to be identified in the beginning stages of the design and factored in to the goals and objectives for minimizing impacts to the environment.	Comment noted. As discussed in response to comment #5 DOI-5, the 60% design submittal will include a separate section on application of green and sustainable remediation practices. PG&E's approach to green and sustainable remediation is aligned with the DTSC Interim Advisory for Green Remediation, and include the following steps: 1. Identify the green sustainability factors (e.g., energy use, materials, greenhouse gas emissions, etc.); 2. Identify sustainability best management practices (BMPs) to address each factor (e.g., reducing the number of site mobilizations, utilizing low-emitting technologies, etc.); 3. Evaluate the sustainability impacts and to assess the benefits of the implemented BMPs.	Okay pending review of 60% submittal		Comment resolved.	See Section 4 – Application of Green Remediation Practices of this BOD Report.
7	DOI-6	General Comment		Treatment and disposal of remedy-produced water is seemingly very complex and labor intensive to implement. This is a result of multiple types of remedy produced water (various sources of backwash water, rehab water [first and second flush], and other sources); options for both trucking and pipeline conveyance of wastewater; each type of wastewater requiring different degrees of treatment; and each potentially having a different final disposition. Although the O&M Plan is expected to flesh out the operational procedures in great detail, the 30% design package should offer further discussion on how wastewater conveyance, treatment, and disposal will be accomplished in practice.	The management plan and proposed facilities for remedy-produced water have been designed with flexibility to support, and not constrain the remedy over the anticipated multiple decades of operation. Figures 1 and 2 are simplified schematics to illustrate the management of the various streams of produced water as proposed in the preliminary (30%) design. Additional details will be included in the draft O&M plan.		Okay pending review of future documents.	Comment resolved.	See Section 3.4 and Appendix F of this BOD Report. Also see the draft O&M Manual (Volume 1 – O&M Plan and Volume 3 – Contingency Plan).
8	DOI-7	General Comment		Selection of the initial carbon source (ethanol or lactate) is still not finalized. As the upland and floodplain ISPTs have been completed, and Hinkley treatment system has been in operation for many years, it is not clear what data or analysis is pending to permit selection of the carbon source.	Based on the past success and level of experience with ethanol, it is currently planned for use in the final remedy, as will be stated in the 60% design. Substrate selection may change over the lifetime of the project as substrate costing varies. In addition, other substrates, such as longer lasting substrates, could be useful for certain situations that arise over the life of the project, and as such documents written to date have preserved the option of using additional substrates.		Okay pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Section 3.2.1.2 (Design Basis) under the heading Organic Carbon Substrate Selection.

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9	DOI-8	General Comment		Suggest adding a figure that includes the approximate chromium (VI) plume boundary, groundwater flow direction, and the remedy design components for reference.	PG&E proposes to add the approx. Cr(VI) plume boundary and groundwater flow direction to Figure 3-1 in the forthcoming BOD Report for intermediate (60%) design submittal.		Okay pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Figure 2.1-1 of this BOD Report.
10	DOI-9	General Comment		The recent findings of high flow rates and elevated contamination levels at Site H must be considered in the discussions of East Ravine bedrock flow and contamination conditions, as well as the remedy design. Although early investigation results for the East Ravine resulted in a preliminary conceptual model by PG&E that fracture flow in the bedrock was of limited rate and radius of influence, and provided the basis for the 30% design, recent findings at Site H raise questions about whether higher flow conditions and fracture interconnectivity may exist within the bedrock. Investigations of the hydrogeologic conditions in the East Ravine bedrock are ongoing, and substantial revision of the conceptual flow and contamination model of the East Ravine may prove to be warranted. The 30% design document must acknowledge the uncertainties in the conceptual model at this time and the possibility for substantial revision of the East Ravine bedrock remedy design at the 60% stage. PG&E should refrain from statements in the 30% design document regarding the bedrock generally having limited fracture interconnectivity, flow rates at wells, and radius of influence.	The 60% design submittal will include an update of the conceptual site model for the East Ravine that addresses conditions observed at Site H.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	Results of the East Ravine groundwater investigation were summarized in a technical memorandum entitled *Addendum to the Summary of Findings Associated with the East Ravine Groundwater Investigation, Pacific Gas and Electronic Company, Topock Compressor Station, Needles, California*. The Addendum was submitted to agencies on November 12, 2012 and results were discussed at the January 17, 2013 TWG meeting in Henderson, NV. Comments were received from DTSC and DOI on February 15, 2013. The Addendum is currently being revised to incorporate comments.
11	DOI-10	General Comment		Given the holidays and time allotment for review of the 30% design package, a detailed evaluation of many of the design elements could not be done to the desired level. DOI has identified some errors and included those in our comments, however we believe there may be others. Due to the aforementioned, we anticipate that an extended review period may be needed at the 60% design to flesh out design details such as piping networks, valving and controls, hydraulic profiles, water mass balance calculations as well as others.	Comment noted. PG&E defers decision on extension of review period to DTSC and DOI.	DTSC agrees that additional review time would be necessary for the review of the 60% design document.			See Exhibit 1.0-1 of this BOD Report, which reflects an extended 60-day review period of CWG/TWG and Tribes and a 75-day review period for DTSC and DOI.

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12	DTSC-GC1	General: Report organization and structure		Current organization of the document is fragmented and makes it difficult to follow a cohesive discussion of design elements. ***Example*** *IRZ Component*: Section 3.2.1 discusses the component of the IRZ, but one must flip to Fig 1-2 to see the proposed layout, then Section 4.4.1 of Appendix B to review the discussion on modeling and resulting well spacing, but the reported differences between the two scenarios were not discussed in that section and was not mentioned until the Section 6 under sensitivity analysis which then points to the corresponding figures in B-39 and B-40. Add to that, the model Figures 27 – 30 did not provide a legend or any notable area of focus, leaving the reviewer to interpret the modeling results. DTSC suggests that the report be reorganized so that each component of the remedy is evaluated from beginning to end with corresponding tables and figures before moving into another component. The report can be tied together with an executive summary, introduction and conclusion.	Comment noted. Each section will be reviewed to ensure report text, figures, tables, conclusions, and supporting materials are tied together well. Figures and tables will be included at the end of each section (instead of at the end of text)	Okay pending review of 60% review		Comment resolved.	See new Executive Summary, as well as locations of figures and tables after each section of this BOD Report.
13	DTSC-GC2	General: Report organization and structure		Design basis/criteria can also be presented in a table format for ease of reference to the rationale to assist review. *For example*: The IRZ injection well backwash pump for IRZ-11 is designed for 40 gpm (shown on design drawings) which is based on 2 times (discussed in Section 3, with no rationale) the maximum injection flow rate of 20 gpm (shown in Table 3-1). This maximum flow rate is found within Appendix B modeling discussion. An example table is already in the document (Page 3-31, Exhibit 3-9 Remedy-Produced Water Conditioning System Design Criteria). It would much easier to review if a similar table is provided for each remedial component.	Comment noted. Design basis/ criteria will be presented in table format (similar to Exhibit 3-9) for ease of reference.	Okay pending review of table		Comment resolved.	See BOD Section 3.2.

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14	DTSC-GC3	General Comment Design Dependencies		Design dependencies are not clear. Do not begin sections by referring readers to other sections. Make a summary, synopsis or substantive argument for the category. Move references at the end of the section as they relate to supporting arguments or summaries. PG&E should develop a risk probability and impact assessment. A probability and impact matrix will provide an understanding of the probability of risks and costs or rewards in taking certain risks. Focus on opportunities and risks and identifies those risks and places values to the risks and response planning, monitoring and control to those risks. PG&E has the opportunity to discuss strategies for negative risks – avoid, transfer or mitigate certain risks, and to discuss strategies for positive risks in order to enhance, expand and ultimately share with stakeholders those inherent risks to get a shared understanding of priorities and responses for contingencies. Such a matrix will allow stakeholders to understand operational constraints and weigh them with other values, costs or risks that may not be associated with PG&E.	See response to comment #12 DTSC-GC1 (Report Organization/ Structure). PG&E intends to use a recognized and established tool (used in industry and government) called Failure Modes and Effects Analysis (FMEA), for preparation of the contingency plans. The FMEA tool provides an analytical and systematic approach to reviewing potential failure modes and their associated causes, and therefore, will help to assess which risks have the greatest concern and to prioritize risk management in order to prevent problems before they arise. Failure modes are any errors or defects in a process, design, or item and can be potential or actual. Effects analysis refers to studying the consequences of those failures.	Okay pending review of 60% design submittal.		Comment resolved.	See draft O&M Manual, Volume 3 – Contingency Plan.
15	DTSC-GC5	General Comment: Communication s Management Plan		Identify methods and criteria to use to inform, resolve issues, approve change requests and corrective actions to unexpected occurrences. It should cover the regular periodic communication that needs to occur as well as when the project experiences unexpected changes. Define what the unexpected changes/risks that may occur and present a risk analysis describe the weekly or monthly status reports and list the chain of communication when a change occurs. Define who should be notified in the case of a significant change – determine factors for what is a significant change (Cr6, byproducts concentrations? other parameters?)	Comment noted. Communications framework, procedures, and protocols will be included in the Draft O&M Plan and the Draft Construction/Remedial Action Work Plan.	Okay pending review of future documents, DTSC, however, recommends that an outline of those reporting frameworks and procedures be provided as early as possible so that stakeholders can begin the evaluation process and develop consensus on framework where applicable.		Comment resolved.	See draft O&M Manual Main text, Section L.2 for communications framework, and O&M Volume 2 (Sampling and Monitoring Plan) for decision rules/ operational framework.
16	DTSC-GC6	General Comment: Scheduling		Identify general process steps, an activity list that includes sequencing of activities and estimated durations for construction and then for operations. Sequencing will describe how activities are interdependent or related. Critical path scheduling will demonstrate what drivers or dependencies are anticipated and assist in the development of contingencies for drivers that we cannot afford to fail. Discussing dependencies and whether they are mandatory or discretionary allows us to agree on importance of issues that may be incidental or critical to all stakeholders whether they are technical, cultural, budgetary or other elements.	Comment noted. An updated project schedule will be provided in the 60% design submittal.	Okay pending review of 60% submittal		Comment resolved.	See BOD Section 7 – Project Delivery Strategy/ Updated Schedule.

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17	DTSC-GC7	General Comment: Contingency Planning		For the 60% design, PG&E should develop in the contingency plan some criteria that may require contingencies to be executed. PG&E should also define measurable short term remedial goals with criteria for the contingencies. This may include contamination (define unacceptable levels Chrome VI or byproducts) increasing or not decreasing as anticipated for a certain period of time, or if the water resources are no longer available (river water vs. HNRW-1 water), etc.	Comment noted.	Okay		Comment resolved.	See draft O&M Manual, Volume 3 – Contingency Plan.
18	DTSC-GC8	General Comment: Progress Reports		PG&E should discuss a method or progress reporting and the parameters to determine progress. Cost, contaminant removal, GSR factors, time, and schedule using methods such as Schedule or Cost performance indices or forecasting techniques.	Comment noted. A discussion on progress reporting will be included in the Draft O&M Manual.	Okay pending review of O&M plan		Comment resolved.	See draft O&M Manual (Main text, Section L.2).
19	HA-GC1	General Comment		As you are aware, the draft 30% BOD is a voluminous compilation of information on the Topock groundwater remedy design basis, design criteria, drawings, and specifications. Additionally, the document reflects the limited information available for presentation at a preliminary (30%) level of design, with the understanding that additional detail, representing a 60% and 90% level of design, will be provided for Tribal review and comment over the next several months. Moreover, as discussed in the *Revised Corrective Measure Implementation/ Remedial Design (CMI/RD) Work Plan for Solid Waste Management Unit (SWMU) 1/ Area of Concern (AOC) 1 and AOC 10* (the "CMI/RD WP"), there are several more items needed to support the design and implementation of the groundwater remedy. Accordingly, the comments issued by the Tribe at this time in review of this 30% BOD necessarily are not to be considered as comprehensive or complete. Essential parts of the plan are missing, for example the monitoring plan and a contingency plan. Thus this review process requires that comments provided at each stage be reconsidered in the context of the newer information so every commenter is afforded an opportunity to reconsider the continuing applicability of earlier comments and/or the need to refine and/or add to those prior comments.	Comment noted. PG&E is committed to deliver the design documents and plans as presented in the CMI/RD Work Plan.	Comment noted.	Comment noted.	Noted.	See draft O&M Manual Volume 2 (Sampling and Monitoring Plan) and Volume 3 (Contingency Plan).

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20	HA-GC2	General Comment		As has been emphasized many times in the past by the Tribe, this remedial project as well as the existing compressor facility and other man-made constructions are present on hallowed grounds and are of deep cultural value to the Tribe. Desecration of the purity and sanctity of these sacred grounds is significant and ongoing as a result of the continuing presence and operation of the compressor station in addition to the impacts associated with the remedial actions. In particular regard to the 30% BOD, the Tribe has concerns over the process leading to the transition from the Interim Measure No. 3 ("IM3") to the final remedy. Specifically, the IM3 water treatment plant (WTP), which is located within and operating within the footprint of the Topock Maze, and is a continuing adverse effect, must be decommissioned as expeditiously as practicable to minimize that adverse effect. The presence of this facility on the sacred Tribal grounds is spiritually harmful and distressing to members of FMIT and other tribes having cultural affinity to this area. Certainly, this situation is not unknown to PG&E, the California Department of Toxic Substances Control ("DTSC"), or the U.S. Department of the Interior ("DOI") ("the Agencies"), to whom this offense has been made known since the start of the IM3 operations. According to DTSC decision documents, the purpose of IM3 is to protect human health and the environment by preventing seepage of groundwater contaminated with hexavalent chromium ("Cr(VI)") into the Colorado River. However, as set forth in the 30% BOD and accompanying materials, upon implementation of the final groundwater remedy, the IM3 will necessarily be shut off and thus will be providing no further protection unless (1) some event were to occur that would result in shutting down the final remedy extraction wells, and (2) the IM3 WTP could handle the volume and chemistry of water then needed to be extracted. There is no discussion in the 30% BOD as to any foreseeable scenario under which the final remedy extraction wells would be shut down (to allow IM3 extraction wells to come back on line) or whether under such a scenario the water extracted by IM3 could even be treated by the IM3 WTP. Given that the hydraulic regime associated with IM3 operation are concededly inconsistent (and to a large extent directly opposite) the hydraulic regime associated with the final remedy design, there does not appear to be any reasonably foreseeable scenario under which IM3 would be reactivated. If IM3 is not to be immediately decommissioned upon the completion of startup of the final remedy, which would remove its	PG&E acknowledges the Tribe's statement of its position regarding the decommissioning of IM-3. These topics are currently being addressed in confidential settlement discussions between the Tribe, DTSC and PG&E, and PG&E defers any response on these issues to those settlement discussions.	Comment noted. DTSC agrees that the IM3 Treatment Plant will be decommissioned when the remedy is operating properly and successfully based the remedy decision documentation. IM3 decommissioning is currently a subject of litigation filed by the FMIT. Therefore, additional discussion is deferred.	Defer response.		See BOD Section 7.4 (Criteria for Approval of IM-3 Decommissioning)

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				continuing adverse effect, the agencies must explain what conditions are reasonably foreseeable that support continuing this adverse effect. Additionally, even if there were a scenario under which restarting IM3 would be indicated, the IM3 WTP technology would be incapable of managing the type of chemical treatment and volume that the final remedy would have established in situ. There is presently no technical basis to support continuing the presence of the IM3 WTP following the completion of final remedy startup. While the draft 30% BOD discusses an IM3 transition process broadly in Section 8.3, it is not clear that the criteria listed for this evaluation are those that would necessarily be acceptable to the agencies or to FMIT, nor that the transition process described by PG&E will meet the criteria anticipated by the Agencies. That transition process (including the timing and criteria for directing decommissioning) must be more clearly defined and supported by a reasonable factual foundation.					
21	Hualapai-GC	General Comment		With the assistance of the TRC Committee Hualapai's review focused on the groundwater flow and solute transport modeling described in Appendix B and the estimated 30-year time frame for completion of the remediation. As the Topock modeling incorporated parameters generated from the two In-Situ Pilot Tests (ISPTs) conducted in the upland and flood plain areas, attention was also given to 1) the data generated from these pilot tests, 2) how those data were incorporated into the groundwater model, and 3) the potential impact on estimates of the actual clean-up time frame. We appreciate that the work has been done in a professional and through manner and that the regional model seems to have been developed with appropriate, standard practice and care. Our comments herein are prepared to provide additional, constructive input which we hope will provide positive contributions to the continued design of the remedial system, and to continue to incorporate the concerns and interests of the Tribes. The TRC Committee has been invaluable throughout this review and they welcome the opportunity to discuss any of these points with any technical consultants for the project, and appreciate the opportunity to contribute to a successful and effective remediation.	PG&E appreciates the Tribe's comment and welcomes the TRC's review and inputs.	Comment noted.	Comment noted.		

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Section 1 Comments – Introduction									
22	DOI-12	Section 1.0, Paragraph 2, Sentence 3		Please change the text to "The DOI is the lead federal agency overseeing response actions for land under its jurisdiction, custody, or control …", removing "on or emanating from" for consistency with previous documents.	The text will be changed as suggested.		Okay pending review of text in 60% design submittal.	Resolved pending review of 60% design submittal.	See Section 1.0 of this BOD Report.
23	HA-1a	p. 1-1, para. 3		This paragraph establishes that the scope of this document pertains to the "final groundwater remedy" and distinguishes its purpose "... from other future actions that may be selected for the *soil media* at the Compressor Station." [Emphasis added]. In the past, the Tribe has commented about its concern regarding the project's separation of the groundwater and soils components of this project. Fundamentally, the remedial program makes this distinction, but in reality the potential interrelationship between soil and groundwater contamination is quite evident from various actions and decisions, such as parts of the soils remedial investigation that are designed to test the potential for downward migration of soil contaminants to act as continuing sources of groundwater contamination. See comment #2 below.	The intent of this paragraph is to provide additional information about the decision documents for the groundwater remedy and clarification on terminology to be used in the design document. If helpful, the following text in the last sentence of the third paragraph can be deleted in the 60% design submittal: "…~~to distinguish it from other future actions that may be selected for the soil media at the Compressor Station~~".	Proposed changes are okay.	Proposed changes are okay.		See Section 1.0 of this BOD Report.
24	HA-1b	p. 1-1, para. 4		This paragraph acknowledges that further refinement to the groundwater remedy will result from input provided by "stakeholders, Agencies, and Tribes" throughout the review process that will continue through November of 2012. The obligation of the Agencies to timely and meaningfully consult with the Tribes should be expressly acknowledged. Considering the complex and voluminous nature of these documents, sufficient time for Tribal review should be allocated, which may be greater than 30 to 45 days. The obligation of the agencies to consult with the Tribes should be added to the project's "Rainbow Schedule."	Comment noted. The project's "Rainbow Schedule" includes step and duration for Tribal Consultation, as set forth in the Programmatic Agreement, for each design document (30/60/90%). See Consultation Protocol of the PA (Appendix B).	Comment and response noted. DTSC has requested that additional time be allocated for the review of the 60% design document.	DOI acknowledges the complexity of design documents and have suggested an extension to the review period as well (See DOI Comment 10). We suggest a 60-day review period for the Tribes and stakeholders with an additional 15 calendar days for the agencies to review those comments prior to our comment submittal.		See Exhibit 1.0-1 of this BOD Report, which reflects an extended 60-day review period of CWG/TWG and Tribes and a 75-day review period for DTSC and DOI.

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25	HA-2	Ex.1-1, p. 1-2		This schedule indicates that the East Ravine/Topock Compressor Station Groundwater Investigation is ongoing through January 2012. Again, this is an example of where the schedules for the groundwater and soils investigations overlap but are not in sync. This is an example of where the ultimate impacts of this project may have not been fully and properly assessed. The East Ravine may be an area where groundwater risks have not been fully accounted for thereby adding to uncertainty related to the design and may therefore result in further disturbances in attempting to resolve the uncertainty. The details of the groundwater remedy design for this area will need to be addressed in the forthcoming design reports as indicated on the schedule.	Legal counsel for the Tribe has confirmed in discussions with PG&E counsel that this comment was intended to refer to the status of the East Ravine investigation and not the adequacy of the analysis in the EIR. To date, the East Ravine-Compressor Station Groundwater Investigation has focused on collecting the most important data for the design first and those data (groundwater quality and subsurface lithology) have been and will continue to be incorporated into the design as efficiently as possible, following validation and QA. Information and data from the investigation have been and will continue to be shared and discussed with agencies, stakeholders, and Tribes on screen calls to ensure opportunities for inputs. As mentioned at the January 18, 2012 CWG meeting, the East Ravine-Compressor Station groundwater investigation report will be included as an appendix to the 60% design submittal.	Comment and response noted.	Comment and response noted.		Results of the East Ravine groundwater investigation were summarized in a technical memorandum entitled *Addendum to the Summary of Findings Associated with the East Ravine Groundwater Investigation, Pacific Gas and Electronic Company, Topock Compressor Station, Needles, California*. The Addendum was submitted to agencies on November 12, 2012 and results were discussed at the January 17, 2013 TWG meeting in Henderson, NV. Comments were received from DTSC and DOI on February 15, 2013. The Addendum is currently being revised to incorporate comments.
26	HA-3a	p. 1-3, para. 2		In the first sentence delete the word "considered." The area is indeed sacred to the FMIT. Also, after the words "adjacent lands" add "... are the aboriginal homelands and such lands ..." Delete the next sentence that begins with "The Tribes believe ..." This area is a holy place to the Fort Mojave People. It is hallowed ground based on the religious beliefs of the FMIT and other Native American Tribes.	PG&E acknowledges the FMIT's statement of its beliefs regarding the sacred nature of the area. The text appropriately refers to these statements as statements of belief; this terminology was used in the EIR including the Tribe's comments on the EIR. PG&E also believes that the last sentence of the paragraph should be clarified to more accurately state BLM's findings in the Programmatic Agreement. Accordingly, the last sentence should be revised to state that "….and the BLM has also determined that a traditional cultural property or property of traditional religious and cultural significance that is eligible for listing on the National Register of Historic Places exists in the area of the Topock project <u>within the APE."</u>	Comment and response noted pending review of text in 60% design submittal	Comment and response noted pending review of text in 60% design submittal		See Section 1.1 of this BOD Report.

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27	DOI-13	Section 1.1, Paragraphs 2 & 3		This section is entitled “Background” however the information primarily pertains to the cultural significance of the area. This is misleading. One would expect a background section to provide project history. It is recommended that this section be revised to discuss project history and a new section or subsection be added to address the cultural significance, cultural and historic resources and ecological resources, including the ACEC and HNWR. It is the agencies intent to minimize, to the extent practicable, impacts to the cultural significance of the area and to protect cultural, historic and ecological resources.	The following changes will be made to Section 1.1 (Background) (inserted verbiage shown in underline typeface, deleted text shown in ~~strikethrough~~ typeface): **1.1 Background** The Compressor Station is located adjacent to the Colorado River in eastern San Bernardino County, California, approximately 12 miles southeast of Needles, California, south of Interstate 40 (I-40), in the north end of the Chemehuevi Mountains (see Figure 1-1~~; all figures are located at the end of this document~~). The selected groundwater remedy addresses existing chromium contamination from past discharges of wastewater into the Former Percolation Bed (SWMU1) and the area around the Former Percolation Bed (AOC1) within Bat Cave Wash near the Compressor Station. The groundwater remedy also addresses groundwater within the East Ravine (AOC10) and under the Compressor Station. The following presents a description and history of SWMU1/AOC1 and AOC10 (CH2M HILL 2009d), and description of the cultural, historical, and ecological resources in the project area. **Description and History of SWMU1/AOC1 and AOC10** SWMU1 was formerly the site of wastewater percolation within Bat Cave Wash. AOC1 is defined as areas affected by flow of wastewater from the percolation bed, including the floor of Bat Cave Wash in the area surrounding the location of the discharge area (SWMU1) and the floor of Bat Cave Wash downstream from the discharge area towards the Colorado River. From 1951 to 1970, facility wastewater was discharged to this area and was allowed to percolate into the ground and/or evaporate. In addition, there have been several incidentals releases of facility wastewater, a few of which have resulted in wastewater released to Bat Cave Wash. Wastewater discharged to Bat Cave Wash consisted primarily of cooling tower blowdown (about 95 percent) and a minor volume of effluent from an oil/water separator (OWS) and other facility maintenance operation (about 5 percent). From 1951 to 1964, cooling tower blowdown was not treated prior to being released to the wash. During that period, the cooling tower blowdown contained Cr(VI). From 1964 to 1969, the cooling		Response/additional text are okay pending review of text in 60% design submittal		See Section 1.1 of this BOD Report. Please note that the sentences in italicized typeface under the PG&E Response to 30% Design Comment column of this comment have been added for completeness and accuracy.

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					tower blowdown was treated with a one-step system to reduce Cr(VI) in the wastewater to Cr(III) prior to discharge to the wash. Beginning in late 1969, cooling tower blowdown was treated with a two-step system to reduce Cr(VI) to Cr(III) and then to remove Cr(III) from the wastewater prior to discharge to Bat Cave Wash. The continuous discharge of wastewater to Bat Cave Wash ceased in May 1970 when injection well PGE-08 was brought online. From May 1970 to September 1971, however, some treated wastewater may have been temporarily discharged to the percolation bed in Bat Cave Wash when injected well PGE-08 was offline for repairs or maintenance. All wastewater discharges to the percolation bed in Bat Cave Wash stopped when the first of four single-lined evaporation ponds was installed in September 1971. Since 1989, industrial wastewater from the Compressor Station has been disposed at Class II (double-lined) evaporation ponds. AOC10 (East Ravine) is located southeast of the Compressor Station, and includes four subareas, designated as AOC10a, 10b, 10c, and 10d. Subarea 10a is the location of the termination of a storm drain leading from the southeastern portion of the Compressor Station. The remaining subareas are locations within the East Ravine where water and sediment have collected within low areas or behind one of three earthen embankments. Two historical aerial photographs of this portion of the site show a low area within the AOC10c subarea that apparently contained liquids behind the largest embankment. While the composition of such liquids is not known, it is noted that this is the location of some of the highest chromium concentrations detected in soil sampling. Thin layers of white powdery materials have also been identified in the East Ravine area. Drainage to this ravine includes minor runoff from the access road to the facility, runoff from the mountains to the south, and some runoff from the compressor station. **Cultural and Historical Resources** The Topock site and adjacent lands are contained within a larger geographic area that is considered sacred by the Fort Mojave Indian Tribe and by other Native American Tribes. The Tribes believe that the environmental, cultural, and spiritual resources may not be physically				

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					perceptible. DTSC has concluded within the January 2011 certified EIR that the project site “appears to qualify as a historic resource under CEQA [California Environmental Quality Act] as an area that is significant in the social and cultural annals of California,” and the BLM also has determined that a traditional cultural property or property of traditional religious and cultural significance that is eligible for listing on the National Register of Historic Places exists in the area of the Topock project within the APE (AECOM 2011). *The Topock site is also located in a Riparian and Cultural Area of Critical Environmental Concern (ACEC), designated under the BLM Resources Management Plan (BLM 2007).* Thousands of years of human history are evident in the area surrounding the Compressor Station. Among the larger and better known cultural resources on the site is an expansive desert geoglyph or intaglio known as the Topock Maze. Although the Maze is viewed as one contiguous element of a larger area having unique value to some Tribes, archaeological documents refer to three geographically-distinct parts, two of which overlie the groundwater plume. Prominent historic-era features in the landscape, several of which intrude upon the Maze and also overlie the groundwater plume, include segments of historic United Stated Route 66, the National Old Trails Highway, and the right-of0way of the Atlantic and Pacific/Atchison, Topeka, and Santa Fe Railroad. A broad spectrum of archaeological resources is also present within the project area and on adjacent lands. Properties on and near the Topock site that are eligible for or listed on the National Register of Historic Places include Native American cultural resources and elements of the historic “built environment”. **Ecological Resources** A large portion of the site and surrounding area is the Havasu National Wildlife Refuge (HNWR). The Lower Colorado River National Wildlife Refuges Comprehensive Management Plan 1994-2014 (USFWS and BOR 1994), adopted in 1994, currently guides land management at the HNWR. The Comprehensive Management Plan emphasizes that the HNWR should be used in a manner that will facilitate protection of (1) the endangered and threatened species found in the Refuge, (2) marsh and wetland				

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					habitat for both endangered and threatened species, and (3) habitat for migratory, wintering, and nongame avian species and their habitat. *Portions of the Topock site are also located in an Riparian and Cultural ACEC and the Topock-Needles Special Cultural Resource Management Area (SCRMA),* designated under the BLM Resources Management Plan (BLM 2007). In recognition of this, all remedial activities are planned in such a way as to minimize impact to this area. Specifically, impacts to cultural resources will be minimized by implementing the mitigation measures required by the EIR and the Programmatic Agreement. The work will be conducted in a manner that recognizes and respects these resources and the spiritual values of the area. ~~Practices that will be implemented with this objective in mind include: minimizing additional disturbance to the area by installing facilities in previously disturbed areas where possible; minimizing the size of drilling pads and staging areas; use of all-terrain drilling and sampling equipment in areas not served by existing roadways; constructing wells with multiple well screens at different depths in a single boring where possible rather than drilling individual borings for each well depth; minimizing the amount of equipment and duration that equipment is present on site; and providing training to all site employees to ensure that they are aware of and respectful of the spiritual value of this area that is considered sacred by certain Tribes.~~				
28	DOI-14	Section 1.1, Paragraph 3, Sentence 2		The text states that “impacts to cultural resources will be minimized by implementing the mitigation measures required by the EIR.” Although it is further discussed in Section 1.2.2, this paragraph should acknowledge that mitigation measures will be developed in accordance with the BLM PA and the CHPMP and in consultation with the Tribes throughout the design process.	The following text will be added to this paragraph in the 60% design submittal: “In addition, mitigation measures will be implemented in accordance with the PA and the CHPMP and in consultation with the Tribes throughout the design process”.		OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Section 1.1 of this BOD Report.
29	HA-3b	p. 1-3, para. 3		The Final Environmental Impact Report[1] (“FEIR” or “EIR”) concluded that “... even with the implementation of mitigation ... significant impacts to the Topock Cultural Area ... within the project area are expected to be significant and unavoidable.” This paragraph should reiterate this conclusion. [1] DTSC, 2011. *Final Environmental Impact Report for the Topock Compressor Station Groundwater Remediation Project.* SCH #2008051003. p. 6-33.	PG&E acknowledges the comment and the conclusion in the EIR. It is not necessary, however, for the basis of design report to reiterate conclusions set forth in the EIR.	The draft EIR is a record in itself. The resulting potential project impacts are used for the project decision. Restating a conclusion in the EIR in the design is not necessary.	Defer response.		

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30	HA-3c	p.1-3, para. 3		Consultation with the Tribe is ongoing, so this list of mitigating measures is incomplete. Each step of the remedial project will require consideration of further mitigation to address potentially different and additional impacts of the particular action. Among the mitigating measures required by the EIR, the list should also include a commitment to continue working with the tribes to establish work implementation policies that are acceptable to the tribes, such as the ongoing effort to establish a disturbed soils policy and a well decommissioning policy or procedure. There should also be a mechanism established so that the effectiveness of the adopted mitigation measures is regularly assessed and mechanisms to improve mitigation performance established.	Counsel for the Tribe, in discussions with PG&E counsel, has confirmed that the reference to further mitigation in this comment refers to consideration of further mitigation measures already specified in the EIR. The summary of measures on page 1-3 is a short list of the measures in Table 7-1, which provides a summary of how the 30% design complies with the EIR. If helpful, the following text can be deleted in response to this portion of comment: " ~~Practices that will be implemented with this objective in mind include: minimizing additional disturbance to the area by installing facilities in previously disturbed areas where possible; minimizing the size of drilling pads and staging areas; use of all-terrain drilling and sampling equipment in areas not served by existing roadways; constructing wells with multiple well screens at different depths in a single boring where possible rather than drilling individual borings for each well depth; minimizing the amount of equipment and duration that equipment is present on site; and providing training to all site employees to ensure that they are aware of and respectful of the spiritual value of this area that is considered sacred by certain Tribes~~." Regarding the request to include a commitment to continue working with the tribes, PG&E re-iterates here our commitment to work with Tribes through our ongoing processes, our MOUs, and implementation of numerous EIR mitigation measures (e.g. CUL-1a provides for tribal input to the final design. (Final EIR at 4.4-62).) Specifically, PG&E has convened a Technical Review Committee that includes technical representatives of the Interested Tribes to review project-related documents, participate in project-related meetings, and advise interested tribal members on technical matters relating to the final design and remedy. (Final EIR at 4.4-64.) Tribal representatives on the Technical Review Committee have input into work implementation policies, including the disturbed soils policy and the well decommissioning procedure. Further, the mitigation monitoring and reporting program (MMRP) as implemented by a Qualified Cultural Resource Consultant ensures that the effectiveness of adopted mitigation measures is regularly assessed and that if necessary, mechanisms to improve	The evaluation of mitigation measures is a subject of litigation. DTSC is committed to continue dialogue with all interested tribes during the design, construction and implementation of the remedy.	Defer response.		See Section 1.1 of this BOD Report.

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					mitigation performance will be established. (Final EIR at 4.4-63.) Finally, the Cultural Impact Mitigation Program (CIMP) is being developed in coordination with Interested Tribes and shows PG&E's commitment to working with the Tribes. (Final EIR at 4.4-65-4.4-66.) Through the development of the CIMP, the Tribes will have the opportunity to participate in the creation of many design specific protocols and methods, including, among others, protocols to for continued communication between PG&E and the interested Tribes, protocols for the appropriate treatment of archaeological materials that may be disturbed, protocols for the review of cultural resource-related documents, protocols for the review of project design documents, protocols for the appropriate methods to be used to restore the environment on decommissioning individual groundwater remedy facilities, a plan for decommissioning and removing the IM-3 facility, protocols for the repatriation of clean soil cuttings generated during Project activities, and provisions affording sufficient tribal monitors to observe ground-disturbing activities and/or other scientific surveying that may occur in preparation for construction activities. (Id.) Tribal consultation is also ongoing pursuant to the Programmatic Agreement's Consultation Protocol. Additionally, the mitigation measures under the Programmatic Agreement and the Cultural and Historic Properties Management Plan are also being followed in order to minimize impacts to cultural resources.				

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31	HA-4a	p. 1-4, Section 1.2.1 (Remedial Action Objectives)		The Tribe has previously commented on the fact that these RAOs do not include goals for minimizing cultural impacts in the course of implementing this list of technical objectives. The impacts to the cultural setting have and continue to affect the health and well being of the Mojave people mentally, emotionally, and spiritually. It should be noted that the American Society for Testing and Materials (ASTM) has recognized the need for non-risk RAOs in addition to risk-based corrective action measures.[2] Non-risk criteria are typically non-numeric narratives. Among the non-risk criteria listed in the ASTM standard are property use requirements and community concern, both of which may relate to concerns of the Tribe. [2] ASTM, 2012. ASTM E2616 - 09 *Standard Guide for Remedy Selection Integrating Risk-Based Corrective Action and Non-Risk Considerations.* Accessed at: http://www.astm.org/Standards/E2616.htm	Comment noted. As the RAOs for the groundwater remedy are established in the decision documents, PG&E defers to DTSC and DOI.	The RAOs were identified and established during the CMS/FS documentation. The RAOs were developed by following the USEPA guidance to define RAOs by media, and specific for each receptor group. The RAOs are consistent with the National Contingency Plan for measurable objectives. In reviewing the scope established by the ASTM standards, the non-risk remedial action objectives are stated as objectives which “may include resource protection standards and the prevention of aesthetic or nuisance impacts in addition to protection of human health and the environment” The scope of the ASTM E2616 further states that “other non-risk criteria are typically non-numeric and may include: remediation timeframe, implementability, cost effectiveness, regulatory compliance, property use requirements, liability control, and community concern.” Although the Tribe may object to the conclusions, DTSC believes that through our remedy selection process, including the certified EIR, these goals have been considered,	The RAOs provided in the CMS/FS are based on CERCLA guidance. The National Contingency Plan specifies that “In developing and, as appropriate, screening the alternatives, the lead agency shall: Establish remedial action objectives specifying contaminants and media of concern, potential exposure pathways, and remediation goals. Initially, preliminary remediation goals are developed based on readily available information, such as chemical-specific ARARs or other reliable information.” The RAOs for the Topock Groundwater remedy were established during the development of the CMS/FS and finalized in the DOI ROD and the DTSC FEIR and Decision Package. DOI will consider the ASTM guidance in the development of the soil CMS/FS and future decision documents.		

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32	HA-4b	p. 1-4, Section 1.2.2 (Incorporation of ARARs ...)		This section states that the Bureau of Land Management's (BLM) Programmatic Agreement (PA) has helped "... to guide the BLM's planning and decision-making as it affects cultural and historic properties specific to the groundwater remedy." Please provide an example as to how this process has served to properly protect the Topock Cultural Area. Furthermore, only one tribe, the Hualapai, signed the PA. Other affected tribes did not based on the fact that the PA failed to address a number of their concerns. The Tribes are requiring that formal consultation be carried out on a government-to-government basis with non-signatory tribes pursuant to Section 106 of the National Historic Preservation Act. The language in this section does not portray this situation accurately. The language should reflect the process being used to engage Tribal perspectives on this project	PG&E defers to BLM/DOI.		Comment noted. The BLM, the CA and AZ SHPO's, and the Advisory Council for Historic Preservation executed the Programmatic Agreement (PA) on October 26, 2010. The execution of the PA streamlines the consultation process, and allows the implementation of the Selected Remedy in a timely manner. All further consultations with the nine federally-recognized American Indian tribes affiliated with the PG&E Topock Remediation Project are to be conducted in furtherance of BLM's compliance under Section 106 and pursuant to the PA Consultation Protocol (Appendix B). The BLM made a reasonable and good faith effort to gain and incorporate the views of the FMIT and other consulted tribes into the PA for this Undertaking. The provisions of the PA will be followed as the Topock Remediation Project proceeds. The Cultural and Historic Properties Management Plan (CHPMP) is the treatment plan for how effects to historic properties and cultural values will be taken into account given approval and implementation of the Selected Remedy. The PA also stipulates how consultation under the National Historic Preservation Act (NHPA) will occur as the selected Remedy is implemented. Initially, none of the consulted Tribes signed the PA as Invited Signatories and two tribes (FMIT and the Hualapai Tribe) expressly declined to do so. Later, the Hualapai Tribe changed their position and signed the PA on July 20, 2011. Tribal views regarding the significance of the cultural resources and values adversely		

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							affected and the importance of mitigating adverse effects on those resources and values will continue to be solicited through government to government and face to face consultations under the Consultation Protocol of the PA (Appendix B) and incorporated into the decision-making process.		
33	HA-4c	p. 1-4, same section, last para. – (refer to earlier comment # 3)		Again, this paragraph understates the fact that mitigating measures "... capable of reducing these impacts to less-than-significant levels" could not be enacted for several cultural impacts important to the Tribe. The Tribes have throughout this process stated that anything that transpires on the hallowed ground is an impact of irreversible and damaging effect and further desecrates the area. No mitigation can resolve such impacts to the spiritual cleaning area we know as present-day Topock.	As this statement is from the EIR, PG&E defers to DTSC.	Comment noted.	Comment noted.		
34	DOI-15	Section 1.3, Paragraph 1		Please ensure that the text is updated, as appropriate, and refers to the Consent Decree between DOI and PG&E when it becomes available.	Comment noted. The final Consent Decree will be referenced when it is available.		Response noted.	Comment resolved.	The Consent Decree executed in 2012 and lodged with the court in January 2013 was referenced throughout this BOD Report.
35	DOI-11	Section 1		A Section 1.4 should be added that summarizes the specific elements of the design that will be included in the 60% design package and are either not included in the 30% design package or will be extensively refined. This refers to design details only, not plans and other submittals as shown in Table 8-1.	PG&E proposes to add a table, instead of a separate section, into the 60% design submittal that meets the substantive requirements of DOI's request.		Okay pending review of 60% design submittal	Resolved pending review of 60% design submittal.	See Exhibit 1.3-1 of this BOD Report.
Section 2 Comments — Baseline Site Conditions and Pre-Design Work									
36	HA-5	p. 2-1, Section 2.1.1 (Hydrogeologic Setting), para. 3		This paragraph attributes the fluctuations in the Colorado River primarily due to regulation at Davis Dam. Does Parker Dam also play a significant role in affecting River stage?	Parker Dam does play a role in the river fluctuation pattern, mainly during heavy rain/higher river flow conditions. Our river level predictions are tied to the Davis Dam release rates and Lake Havasu level. Most of the time, the Davis Dam releases are the dominant factor in determining river levels at Topock. This text will be added to the 60% design submittal.	Noted pending review of text in 60% design submittal	Noted pending review of text in 60% design submittal		See Section 2.1 of this BOD Report.
37	HA-6	p. 2-1, Section 2.1.1 (Hydrogeologic Properties)		Please provide an approximate value or range of values for the magnitude of the landward hydraulic gradient imposed by the IM.	The hydraulic gradient imposed by IM-3 pumping is measured in three pairs of monitoring wells. Over the period from August 2007 through December, 2011, the average landward gradient in these three wells pairs has been approximately 0.005 ft/ft. This information will be added to the first bullet under Section 2.1.2 (Hydrogeologic Properties).	OK	Okay.		See Section 2.1 of this BOD Report.

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38	Hualapai-31			<u>Further considerations for the 60% Design Evaluation</u> The CMS-FS reported, and DTSC confirmed, that there will be "recalcitrant" areas that may be difficult to remediate. 5.3.6 Alternative E – In-situ Treatment with Fresh Water Flushing (starting p. 5-30). Note that, on page 5-31: *The estimated time for five pore volumes to be flushed with this alternative is approximately 29 years. The actual cleanup time will be dependent on the rate at which organic carbon can be distributed to all areas of contaminated groundwater in the flood-plain and/or contaminated groundwater in recalcitrant zones in the upland areas can be flushed to the IRZ treatment line where it will be treated by injected organic carbon. These factors are subject to considerable uncertainty. It is estimated that the range of cleanup time is from 10 (based on two pore volumes) to 110 years (based on 20 pore volumes). The estimated time for this alternative is derived based on the assumed configuration described above. The estimated time for this alternative could be adjusted by modifying the number and location of wells and/or by modifying the flow rates. Under this alternative, an institutional control would be maintained during the remediation period to restrict use of groundwater in the plume area until the cleanup goals are attained, thereby eliminating the pathway for human health risk from direct exposure to groundwater. The area subject to the institutional control would include a buffer area surrounding the plume to prevent the consumption of water that potentially could migrate from the plume in other directions as a result of pumping from hypothetical future local water supply wells.* Note that the concept of "recalcitrant" zones is mentioned in several of the remedies that were discussed in this document. So it is a concept that was included in the evaluation of each of these remedies prior to the selection of the current remedy. There are data gaps in the understanding of these recalcitrant areas. If these could be mapped by examination of core logs, for example, then these areas could be stimulated either with higher TOC concentrations or introduction of Cr-reducing microbes.	The range of cleanup times of alternatives presented in the CMS/FS was based on a pore-volume flushing approach which was based on observed data from in situ pilot study tracer data and floodplain stable isotope data. In those cases, the approximate range of pore volume flushing required to replace initial groundwater concentration with final concentration was 2-20 pore volumes. This was considered a reasonable screening tool for comparison of alternatives. The current model uses reactive solute transport parameters to estimate concentration changes over time. Recalcitrant zones in groundwater cleanup projects may be caused by several factors. The most common is probably high concentrations of contaminants in low permeability silt or clay zones. Other causes can be stagnation points in the groundwater flow field, or in the case of in-situ remediation, geochemical heterogeneities that adversely affect the chemistry of the in-situ process. Examination of core logs would not be expected to yield useful data on the location of recalcitrant zones. In the complex alluvial fan depositional environment of the Topock site, there is often very little correlation in lithology even between adjacent wells, so the core logs do not provide a clear picture of where sizable silt or clay inclusions may exist. Even if it were possible to identify sizable clay inclusions from the core logs, there is no data from which to determine the concentration of Cr(VI) in the clays. A clay inclusion that is not contaminated does not represent a recalcitrant zone, so there would be no need to apply additional remedial effort to it. Recalcitrant zones typically become apparent after a few years of remediation. At that time, optimization measures can be implemented as necessary to speed the cleanup in recalcitrant zones.	Response noted.	Comment and response noted.		
39	DOI-16	Section 2.1.2/2-2/1st Paragraph/last sentence		It should be mentioned that a borehole in the East Ravine encountered a flowing bedrock fracture.	A full discussion of the ramifications of the conditions encountered at Site H will be provided in the 60% design submittal.	OK pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Section 2.1 of this BOD Report.

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40	DOI-17	Section 2.2/2-2/ 1st Paragraph/last sentence		There should be some discussion of the mechanism by which bedrock groundwater is contaminated if there are upward gradients from the bedrock to the alluvium.	Below are some potential mechanisms: 1) There is photographic evidence of surface water ponding in East Ravine. During the time the ponds were present, there could have been sufficient head in alluvial aquifer at the ponds to overwhelm the slight upward gradients we see today between bedrock and alluvium. 2) The discharge of cooling water in Bat Cave Wash may have elevated groundwater levels in the alluvium relative to the bedrock, producing downward gradients under the compressor station and along alluvial bedrock contact at the north edge of East Ravine. There are insufficient data to identify to what extent these or other potential mechanisms may be responsible for Cr(VI) in East Ravine bedrock.		Okay.	Resolved	
41	DOI-18	Section 2.2, Last Paragraph, Sentence 5		The statement that “bedrock in East Ravine has relatively few conductive fractures” is broad and not well supported as evidenced by the extent of the plume and conductivity of some of the wells. For example, a borehole in the East Ravine (Site H) encountered a flowing bedrock fracture. This information should be added to support the discussion of conductive fractures.	As noted in response to comment #10 DOI-9, the 60% design submittal will include an update of the conceptual site model for the East Ravine that addresses conditions observed at Site H.		Okay pending review of 60% design submittal.	Comment resolved.	See Section 2.2 of this BOD Report. Results of the East Ravine groundwater investigation were summarized in a technical memorandum entitled *Addendum to the Summary of Findings Associated with the East Ravine Groundwater Investigation, Pacific Gas and Electronic Company, Topock Compressor Station, Needles, California*. The Addendum was submitted to agencies on November 12, 2012 and results were discussed at the January 17, 2013 TWG meeting in Henderson, NV. Comments were received from DTSC and DOI on February 15, 2013. The Addendum is currently being revised to incorporate comments.

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42	DTSC-1	Page 2-3, 3rd Paragraph	Though the interpretation of the southern extent of the chromium plume has expanded slightly due to new wells being installed since the CMS/FS (CH2M HILL 2009d), other parts of the plume have shrunk since that time, resulting in a slightly smaller extent overall.	What basis is PG&E using to state that the resulting plume is slightly smaller overall when the Eastern extent of East Ravine is still unknown?	The shallow plume was drawn around all East Ravine wells, similar to what was done for the CMS/FS. It is acknowledged that the ER has not been fully characterized, and the southern boundary of the plume remains an approximation. The 60% submittal will provide updated plume dimensions. For clarification, the sentence will be deleted in the 60% design report,	Okay		Comment resolved.	See Section 2.2 of this BOD Report.
43	DTSC-2	Section 2.3, Baseline Distribution of Other Compounds		Generally this section needs to include a design discussion on how the baseline distribution of each constituent discussed has a capacity or probability [or not] of impacting the proposed design. While the discussion on the distribution brings out salient qualities of the COPC, a direct statement on the design impact or lack thereof is missing.	Text will be added to clarify that the COPCs (selenium, molybdenum, and nitrate) and other general geochemical indicators parameters (TDS and sulfate) are not expected to impact remedy performance and therefore do not impact the design. With regards to TDS and sulfate, pilot test data indicates that Cr(VI) treatment is not affected by the presence of TDS and sulfate, as presented at the January 6 and January 19, 2012 TWG meetings. These findings will be discussed in the text. With regards to in-situ byproducts, the remedy is already designed to control the generation and migration of these compounds.	Okay		Comment resolved.	See Section 2.3 of this BOD Report.
44	DTSC-3	Page 2-3, 2.3 Baseline Distributions of Other Compounds		The document will need to expand the list of baseline constituents to the full title 22 metals list as well as a full suite of general minerals, etc., as DTSC will require these analyses during early startup of certain remedial facilities. For injection wells, the program will be very similar to that previously used at IM-3 injection wells.	Comment noted. A statistical summary table (similar to Table 2-1) will be included in the Draft O&M Manual for the full Title 22 metals list and available general minerals information, This will serve as a point of comparison for remedy monitoring data in the future.	Okay		Comment resolved.	See Table 2.2-2 of this BOD Report that includes a statistical summary of the full Title 22 metals and available general minerals information.
45	DTSC-4	Section 2.3.1, Page 2-3, Constituents of Potential Concern		Each section should include a discussion of the level of concern of the COPC existing presently and evolving during the remediation, and qualitatively discuss whether the COPC is a design driver or significant/insignificant risk factor to consider in the remedy and why. Then summarize how contingencies can be developed or alternatives to address those factors.	Text will be added to clarify that the COPCs (selenium, molybdenum, and nitrate) are not expected to impact remedy performance and therefore do not impact the design. The 2009 Groundwater Risk Assessment (ARCADIS 2009) concluded that selenium, molybdenum, and nitrate do not represent a significant health risk too future hypothetical users of the groundwater.	Okay		Comment resolved.	See Section 2.3 of this BOD Report.

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46	DTSC-5	Page 2-3/2-4, Section 2.3.1.1 Selenium		The section should be revised to indicate that elevated selenium almost exclusively occurs within or immediately adjacent to the boundary of the chromium plume. Well MW-17 is the only exception out of the eleven elevated wells as evidenced in Figure 2-4. Revise the section to indicate that elevated selenium is not discontinuous across the site as illustrated by the cluster of orange and magenta dots on Figure 2-4. Figure 2-4 can be interpreted to indicate that elevated selenium occurs within the general core of the chromium plume with the highest concentrations under the compressor station proper. Revise the section to indicate that significantly elevated selenium occurs at wells TW-1, MW-67-225, and MW-66-165 which are all located within the fence line of the compressor station, and therefore, suggestive of a compressor station source. The basis for elevated selenium levels related to colloidal breakthrough mentioned on page 2-4 should be discussed and supported. If not supported, the reference should be deleted. Would all metals exhibit similar levels of colloidal breakthrough? The section indicates that reducing conditions resulting from the remedy will likely limit selenium mobility. This assertion will need to be verified via selenium groundwater monitoring within the plume during the operation of the remedy. Text should be modified to indicate that the regional background concentrations mentioned on these figures (e.g., Figure 2-4) are background concentrations for the regional alluvial aquifer, and are not applicable to bedrock.	The 60% design submittal will honor the text used to describe selenium, molybdenum, nitrate, and TDS in the RFI/RI Vol 2 Addendum (CH2M HILL, 2009x), while accounting for any changes in distribution of these constituents since the RFI/RI was completed. Colloidal breakthrough in the samples will yield variable results based on the amount and composition of the colloids. Language used to describe this concept will be consistent with that used in the RFI/RI. Text will be added to stress that groundwater monitoring will be conducted to verify. Text will be added to indicate that Background Study UTLs listed for selenium, molybdenum, and nitrate were based on unconsolidated aquifer samples and not bedrock aquifer samples.	Okay pending review of the 60% design submittal		Comment resolved.	See Section 2.3 of this BOD Report.
47	DTSC-6	Page 2-4, Section 2.3.1.2 Molybdenum		Groundwater risk values associated with molybdenum should be mentioned, as an MCL does not exist, to assist in evaluating the significance of this constituent. The sentence on discontinuous distribution of molybdenum in the shallow zone wells should be modified to indicate that elevated concentrations (orange and magenta dots on Figure 2-5 – Shallow Wells) cluster to the south similar to the non-discontinuous Mid-Depth Zone. Text should clarify that the elevated molybdenum detected in groundwater is likely related to releases from the compressor station based on historical and current molybdenum use and documented releases. The section should indicate if reducing conditions resulting from the remedy will or will not likely limit molybdenum mobility (as stated in the document previously for selenium – see above).	See response to comment #46 DTSC-5.	Okay pending review of the 60% design submittal		Comment resolved.	See Section 2.3 of this BOD Report.

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48	DTSC-7	Page 2-4, Section 2.3.1.3 Nitrate		The section discussing the distribution of nitrate should be rewritten to indicate that Figure 2-6 clearly shows that almost all elevated nitrate (including values greater than the MCL) occurs within the confines of the chromium plume, suggesting that nitrate is a contaminant related to PG&E compressor station activities.	The 60% design submittal will honor the text used to describe nitrate in the RFI/RI Vol 2 Addendum (CH2M HILL, 2009x), while accounting for any changes in distribution of these constituents since the RFI/RI was completed.	Okay pending review of the 60% design submittal		Comment resolved.	See Section 2.3 of this BOD Report.
49	DTSC-8	Section 2.3.2, In-situ By-products	Citation of Table 2-2	Should be Table 2-1	This will be corrected in the 60% submittal.	Okay		Comment resolved.	See Section 2.3 of this BOD Report.
50	DTSC-9	Section 2.3.2, In-situ By Products, Page 2-4, paragraph 2,		In the opening statement, qualitatively summarize the important elements of Table 2-2 and do not depend on the reader to review the Table to interpret your sampling trend or results. This critical flaw is throughout the core document. Move first sentence identifying the COPC distribution Figures' locations to the end of the sections. Begin each sentence for each COPC with a qualitative or design statement relating the COPC impact on the design.	Discussion in text will be shifted in the 60% design submittal to emphasize the key points that may be concluded from the statistical summary in Table 2-1.	Okay pending review of 60% language.		Comment resolved.	See Section 2.3 of this BOD Report.
51	HA-7	p. 2-4, Section 2.3.2 (In-Situ By-Products)		It would be helpful to provide further details as to the anticipated behavior of these by-products in the subsurface environment, particularly at the anticipated geochemical interfaces along the flowpaths. While this information has been studied as part of the in-situ testing, geochemical and transport modeling, etc., it would be helpful to provide further discussion to facilitate the understanding of the anticipated behavior of these chemicals and the remedy processes that will control their migration as was discussed during recent TWG exchanges.	A detailed discussion of the generation and attenuation mechanisms at geochemical interfaces along flowpaths was provided in Section 8 of Appendix G in the CMS. The following text will be included in the 60% design submittal: Arsenic is primarily in the As(V) form in most areas of site groundwater. In the pH range of site groundwater, its form in solution is dominated by $HAsO_4^{2-}$. This anion tends to adsorb to the positively-charged surface of iron oxide minerals, which are present in the more oxidizing areas of the aquifer. This adsorption reaction maintains arsenic at concentrations below the UTL in most areas of the site. During the remedy operation of the IRZ, reducing conditions produced by the injection of organic carbon will dissolve iron oxide minerals in the surrounding matrix by reducing the Fe(III) in the oxide to Fe(II), which is soluble. The half-cell redox reaction may be written as: $Fe(OH)_3(s) + 3H^+ + e^- \rightarrow Fe^{2+} + 3H_2O$ with e^- representing electron, $Fe(OH)_3(s)$ as iron oxide (many variations on this formula exist in nature), and Fe^{2+} representing reduced iron or Fe(II). Coupled with this reaction would be another half-cell reaction showing equal oxidation of an electron donor, in this case ethanol going to carbon dioxide: $1/12\ C_2H_6O + 1/4\ H_2O \rightarrow 1/6\ CO_2 + H^+ + e^-$ where C_2H_6O is ethanol, the form of	Noted. Further evaluation will occur during review of the 60% design.	Noted. Further evaluation will occur during review of the 60% design.		See Section 2.3 of this BOD Report.

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					organic carbon to be injected in the IRZ. The combination of organic carbon oxidation and iron reduction is a simplified model version of the family of reactions that occur in the IRZ, but effectively illustrates how iron and arsenic associated with iron minerals get released under these conditions. As the liberated Fe(II) and arsenic move downgradient from the IRZ into more oxidizing conditions, the iron will undergo the reverse reaction of that shown above, and the arsenic will either coprecipitate with the iron or adsorb onto the surface of the newly-formed solid, or both. The representation of these mechanisms in the numerical transport model was described in Appendix B of the 30 percent design Manganese is present in the matrix in the form of various oxides, similar to those of iron. Manganese is liberated around the IRZ in a similar reductive dissolution reaction to that of iron, with Mn(IV) and Mn(III) in the oxide reduced to Mn(II) and released into solution. Manganese is slower to reoxidize than iron, so it will travel further downgradient before the reverse reaction occurs to remove it from groundwater. During transport, Mn(II) is also attenuated by adsorption onto mineral surfaces. The representation of these mechanisms in the numerical transport model was described in Appendix B of the 30 percent design Additional geochemical processes affecting the behavior of dissolved metals occur within the hyporheic zone, the interface between the groundwater and the river. A conceptual level figure detailing these processes was included as Figure G8 in Appendix G of the CMS and discussed at the January 19, 2012 TWG meeting. A model is currently being constructed to evaluate geochemical/hydrological processes governing manganese behavior in the hyporheic zone (groundwater-river interface) as groundwater flows toward the river. This model focuses on Mn, as As is not expected to reach the hyporheic zone. The results of this model will be described in the 60% design and as such will include a more detailed discussion of the geochemical processes governing byproduct fate and transport.				

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52	DTSC-10	Page 2-5, Section 2.3.3 General Geochemical Indicator Parameters		The section emphasizes the natural occurrence of TDS and sulfate, yet makes no mention of anthropogenic sources. Some text should be dedicated to clarify that the large releases from the PG&E Compressor Station facility would have exhibited elevated TDS and general minerals (e.g., concentrated blow down water from the cooling towers) and that those releases would have mixed with unaffected waters. Please note that salts (Electrical Conductivity) were listed as hazardous waste constituents of concern in the 1996 DTSC Consent Agreement, and were sampled during various phases of PG&E compressor station site characterization and closure activities.	The 60% design submittal will honor the text used to describe sulfate and TDS in the RFI/RI Vol 2 Addendum (CH2M HILL, 2009x), while accounting for any changes in distribution of these constituents since the RFI/RI was completed.	Okay pending review of the 60% design submittal		Comment resolved.	See Section 2.3 of this BOD Report.
53	HA-8a	p. 2-6, Section 2.3.3.1 (Total Dissolved Solids)		As was discussed during recent TWG meetings and conferences, further discussion is needed as to the significance of the variably high concentrations of TDS within the aquifer as this may relate to the efficacy and operation of the groundwater remedy. Is there any component (*e.g.,* chloride, sulfate, etc.) of the TDS that may pose particular concern to remedy effectiveness? Was there any sensitivity analysis performed on the potential effects of density heterogeneity?	The composition of the groundwater has been taken into account in designing the remedy, and information was collected during the two pilot studies to examine effects of water chemistry on the in situ remedy. There are no constituents that posed concern in the design. In particular, Cr(VI) reduction was observed in the presence of elevated TDS concentrations, as presented at the January 19, 2012 TWG meeting. A discussion of this data will be included in the detailed response to comment in the 60 percent design. Variations in density were not applied in modeling the design. The main reason for this is that the vast majority of the groundwater is between about 500 and about 16,000 mg/L TDS, with an average around 5,000 mg/L. The density difference over this range is about one percent, which is not considered significant enough to evaluate density gradients. The areas with TDS greater than 16,000 mg/L are isolated portions of the shallow floodplain and a few deep wells. These areas are limited in extent and none have detectable chromium.	Comment noted. DTSC continues to be concerned with the efficacy of the remedy. However, to date, PG&E has been able to provide reasonable logic to all concerns raised. DTSC will continue to carefully evaluate and monitor PG&E's proposal throughout the design, construction and implementation process.	Comment and response noted.		See Section 2.3 of this BOD Report.
54	Hualapai-33			<u>Additional Technical Considerations</u> It is known that pH affects adsorption rates. Has it been determined how pH varies laterally and vertically within the Topock hydro-geologic system, and is this an issue? Will pH be monitored as part of the system monitoring program?	Average pH values in the remedy area are between 6.5 and 8.5. Most of the pH values that fall between 6.5 and 7.5 are in shallow- and mid-depth floodplain wells, and the remainder are predominantly 7.5 to 8.5, regardless of depth (see Figure 6-1 in the RFI Volume 2 Report). Given these relatively narrow pH ranges, adsorption rates are not expected to be significantly variable on the basis of pH alone. All sampled wells are monitored for pH, and will be monitored for pH throughout the remedy. The effect of pH on Mn sorption will be considered in an expanded discussion on the geochemical parameter sensitivity analyses.	Noted	Comment and response noted.		See Section 2.3 of this BOD Report.

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55	DOI-19	Section 2.4.1, Paragraph 5, Bullet 1		A summary statement of the findings of the EPNG evaluation of the structural and physical space capacity of the arched bridge should be included in this bullet.	The following text will be added to this paragraph in the 60% design submittal: "In its evaluation report, EPNG concluded that the proposed 12-inch freshwater line load is within the acceptable design loads for the bridge. EPNG recommended that equipment larger than 16 kips not be used in any 18.5 ft long deck section and the bridge deck supports be visually inspected prior to construction".	Okay	Okay pending review of 60% design submittal.	Comment resolved.	See Section 2.4.1 and Appendix G of this BOD Report.
56	HA-8b	p. 2-6, Section 2.4.1 (Land Ownership, Disturbance, and Development)		The Tribe requests further details regarding the proposed types of facilities and activities that will be performed on its property for construction and during remedy operation. As a general principle, the Tribe's preference is for as little remediation infrastructure to be placed on its property as possible. The Tribe and PG&E should consider this in the design phase. FMIT requests a meeting to discuss such potential facilities (i.e., the need for, proposed types, longevity, etc.).	The Tribe's preference is recognized and will be further considered during the development of the 60% design, consistent with the 2006 Easement Agreement and the 2006 Settlement Agreement between the Fort Mojave Indian Tribe and PG&E. A statement to this effect will be included in the 60% design submittal.	Comment noted	Comment and response noted.		See Sections 2.4.1 and 5.3.2 of this BOD Report.
57	HA-9	p. 2.7, Section 2.4.1 (Land Ownership, Disturbance, and Development) & Appendix A-2		PG&E has been discussing with the FMIT the preparation of an aerial map of disturbed areas pursuant to EIR Mitigation Measure CUL-1a-9. In particular, H+A transmitted comments to PG&E on July 5, 2011, expressing concerns on behalf of the Tribe.[3] Among the various concerns discussed was the potential for misuse of such a mapping. Specifically, the classification of lands as "disturbed" could lead to the impression that such areas would be "fair game" for further and additional disturbances, whereas there are other factors that the Tribe believes must be taken under consideration. Accordingly, consultation with the Tribe should always be a prerequisite for such planning regardless of whether the land has suffered disturbance in the past. [3] H+A, 2011. Letter from Dr. L.S. Leonhart, H+A, to Dr. Y.J. Meeks, PG&E, re "FMIT Comments on Mitigation Measure CUL-1a-9, Aerial Map of Disturbed Areas."	Comment noted. Existing mitigation measures require communication/ consultation with the Tribes throughout the design process, as reflected on the project's "Rainbow Schedule."	DTSC understands that the tribe does not believe in the generalization that disturbed areas are less significant to other undisturbed area. DTSC agrees that tribal input throughout the design, construction and implementation phrases of the project is important to the collaborative success of the remedy.	Comment noted. Tribal views regarding the significance of the cultural resources and values adversely affected and the importance of mitigating adverse effects on those resources and values will continue to be solicited through government to government and Section 106 consultations under the Consultation Protocol of the PA (Appendix B) and considered in the decision-making process.		See Section 2.4.1 of this BOD Report.

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58	DTSC-11	Page 2-6/2-7, Section 2.4.1 Land Ownership, Disturbance, and Development		The Topock 66 Resort and Spa at the Topock Marina is identified as a planned development. DTSC had heard that it had been cancelled, but did recently check the resort website and noted plans for continuing the development as of July 2011. Based on current plans, a source of water for the development (hotel, brewery, pool, water features, greenscape) would be needed and could influence hydraulics in the area. PG&E must acknowledge this issue and evaluate potential impacts of the development on the remedy (e.g., What are potential effects on the remedy if groundwater is pumped from a well located in the Topock Marina area?) and the remedy on the development. PG&E needs to prepare a comprehensive list of all water wells in the Topock area including historical, current, and potential future pumping rates. DTSC had heard that SoCal Gas had requested pumping rights in the area that should be discussed in this section as well as other applicable sections.	As indicated in the response to comment #136 Hualapai-24, the EIR evaluated water use during construction, during operation, and during decommissioning of the remedy, and in each instance, the EIR concluded that the existing entitlement was more than sufficient to serve the remedy project needs. The basin is adjudicated and pumping is controlled by the Colorado River Board. PG&E will request information on the pumping allocations for water users in the Topock area from the Colorado River Board. These would be the maximum allowable pumping rates under the current water rights. Simulations could be conducted to determine if these maximum pumping rates would have any adverse effects on the remedial action. As requested, PG&E will prepare a list of wells in the Topock Area based on available data, and include the list in the forthcoming freshwater evaluation technical memorandum. According to information from BLM (early 2011), SoCal Gas had planned for a well near the water tanks between I-40 and Moabi Regional Park. The well could be up to 500 feet deep and was intended for cathodic protection, and not for pumping of groundwater.	Okay		Comment resolved.	See Appendix J of this BOD Report.
59	HA-10	p. 2-8, Section 2.4.2 (Site Topography and Surface Geology)		On a recent site walk, Tribal members expressed an interest in developing a three-dimensional (3D) physical model of the Site terrain for the purpose of explaining topographic and physical relationships of project facilities to the general Tribal Membership. In turn, PG&E requested the assistance of the Tribe in facilitating this request. It is hereby reasserted that the Tribe is interested in moving forward with this project. In a recent meeting with the Tribal Community, plastic raised-relief maps created by an impression process were displayed for the Needles and Kingman quadrangles. These products were welcomed and characterized as potentially useful if they could be produced on a larger scale, such as for the project area.	PG&E appreciates the Tribe's facilitation and its assertion in this comment. PG&E has initiated work and is coordinating with the Clearinghouse Task Force (CTF) members to deliver on this project.	Comment noted.	Comment and response noted.		Work on the physical model is underway. No changes were made to this BOD report (text/figures/ tables) as a result of this comment.
60	HA-11	p. 2-8, Section 2.4.3 (Soil Contamination Areas)		See previous comment No. 1 regarding soils.	See response to comment #23 HA-1a.	Comment noted.	Comment and response noted.		See Section 1.0 of this BOD Report.
61	DTSC-12	Page 2-8, Section 2.4.3, Soil Contamination Areas		Figure 2-15 is presented to acknowledge soil/groundwater infrastructure overlap. Greater detail, including detailed figures and sampling and soil management plans, will need to be prepared to evaluate how best to proceed.	Additional details will be provided in the 60% design submittal. Also see response to comment #62.	Okay, pending review of 60% design submittal.		Comment resolved.	See Figure 2.4-4 of this BOD Report and draft O&M Manual, Volume 4- Soil Management Plan.

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62	DOI-20	Section 2.4.3.1, Paragraph 2, Bullet 2		In reference to this bullet, please provide a figure or table of areas where remedy facilities will intersect soil contamination areas.	Comment noted. Figure 2-15 will be updated to include a table to list the overlapping areas in the 60% design submittal to address this comment.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See Figure 2.4-4 of this BOD Report.
63	DTSC-13	Section 2.4.3.1, Coordination of RFI/RI Soil Investigation with Remedy Design and Construction		This section did not mention coordination between the soil investigation and the possible use of an infiltration gallery mentioned in Appendix F. DTSC notes that PG&E has reserved this option for future use pending soil RFI results. If PG&E is maintaining this option as stated, the soil RFI work plan should reflect this proposal. In addition, this section mentions that additional soil investigations and opportunistic sampling are independent of design activities for the final groundwater remedy, but that the soil data would be used as it becomes available. PG&E must, as part of the O&M Plan, provide a soil management plan and sampling analysis plan that describes the logic and processes to follow as part of the remedial construction and soil disturbance (e.g., how to sample and handle trenched soils in a potentially contaminated area).	The Soil RFI/RI Work Plan will incorporate the possible use of an infiltration gallery in Bat Cave Wash for disposal of treated remedy produced water into the sampling plan, and will include collection of relevant and adequate data to support the CMS/FS design. The O&M Manual will include sampling protocols and analysis for soil and plan for managing soils during O&M, consistent with the ongoing discussions about displaced material handling protocols between PG&E, agencies, and Tribes (also see response to comment #64 DTSC-14).	DTSC did not note any proposal in the RFI/RI work plan for soil that incorporated the investigation and development for the infiltration gallery in Bat Cave Wash. However, if PG&E is considering such a proposal, DTSC agrees that it can be coordinated through the soil investigation phase.		Comment resolved.	See Section 2.4.3.1 of this BOD Report. Also see draft O&M Manual, Volume 4 – Soil Management Plan.
64	DTSC-14	Page 2-9, Section 2.4.3.1 Coordination of RFI/RI Soil Investigation with Remedy Design and Construction		A bullet should also be included that addresses maximizing retention of soils to address Tribal concerns. The document should clarify and/or provide examples for the following bullets currently included in the text: • Where appropriate, the timing and scope of soil investigation activities will be coordinated to minimize interference with groundwater remedy implementation. • Access restrictions established to protect groundwater remedy infrastructure will consider the need to access soil investigation areas for additional investigation or remediation.	Consistent with response to comment #181 HA-36, a bullet will be added in the 60% design submittal to mention the ongoing discussions about displaced soils handling protocols between PG&E, agencies, and Tribes. The approach and general protocols discussed to date are intended to minimize the amount of displaced material that leaves the site. Specific topics include handling and storage, contamination assessment, long-term disposition of displaced soil, etc. First bullet – an example is if the timing of the soil investigation and groundwater remedy construction coincides, the work will be carefully synchronized so as to minimize interference/obstruction. Second bullet – an example is when access restrictions are established for the protection of groundwater remedy infrastructure (i.e., Category 2 ICs) in certain areas, consideration will also be given to the potential need to access the same area for additional soil investigation or remediation.	Okay		Comment resolved.	Section 2.4.3.1 of this BOD Report.

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65	DTSC-15	Page 2-9, Section 2.4.4 Surface Water and Wetlands		Figure 2-17: Will the OHWM need to be identified and documented for any Arizona remedy infrastructure (e.g., pipeline) or for the California river bank south of that pictured in Figure 2-17 (e.g., freshwater intake structure). The figure only evaluates a segment of the California floodplain area.	Figure 2-17 is intended to demonstrate compliance with EIR Mitigation Measure AES-2a which states the following: "A minimum setback requirement of 20 feet from the water (ordinary high water mark) shall be enforced, except with regard to any required river intake facilities, to prevent substantial vegetation removal along the riverbank" The requirement for the 20-foot setback from the OHWM is relevant to the aesthetic value from Key View 11. A Key View, according to the EIR, is a vantage point offering a view of some or all of the Project Area from one of the specified points. Each Key View vantage point is located and described in Volume II, Section 4, of the Final EIR. Key View 11 is defined in Table 4.1-1 as "View looking southwest toward the floodplain, IM-3 Facility, and compressor station from Colorado River. View is approximately 300 feet from the floodplain."  Key View 11—View west toward the floodplain, IM-3, and compressor station. *(Photograph taken by AECOM in 2009)* Given the above mitigation directives for AES-2a, the 20-foot setback requirement (hence the need to map OHWM) does not apply to Arizona remedy infrastructure. Further, AES-2a specifically excludes any required river intake facilities. However, it should be noted that the OHWM was identified and mapped (within the project area, in California and Arizona) during the recent wetlands delineation field survey conducted for compliance with EIR mitigation measure BIO-1.	Okay		Comment resolved.	
66	DTSC-16	Page 2-10, Section 2.4.5, 3rd paragraph	This alliance takes many forms and in the Project Area it is form that lacks ironwood (Olneya tesota).	This sentence seems incomplete.	The letter "a" will be inserted between the word "is" and the word form".	okay		Comment resolved.	See Section 2.4.5 of this BOD Report.

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67	DOI-21	Section 2.4.7		Please update the activities required by the Programmatic Agreement to reflect current status of the stipulations (Access Plan and CHPMP) and reflect that a treatment plan will be developed throughout the design to address any mitigation measures.	The Access Plan and the CHPMP will be updated to reflect their current status in the 60% design submittal.		Okay pending review of 60% design submittal.	Comment resolved.	See Section 2.4.7 of this BOD Report.
68	DOI-22	Section 2.4.7, Last Bullet		Please clarify if a draft paleontological report is under review. It is unclear from the discussion. Also, please verify that the report will be available for review by the agencies.	The paleontological report will be submitted to DTSC once complete. A copy will be provided to DOI at that time.		Response noted.	Comment resolved.	See Section 2.4.7 of this BOD Report. A paleontological report was prepared and submitted to DTSC on December 21, 2012; this report is currently being revised to incorporate comments.
69	HA-12a	p. 2-12, Section 2.4.7 (Cultural Resources)		1st sentence, "Cultural resources occur in areas near some groundwater remedial facilities and will affect design, construction and implementation of the final groundwater remedy." - First, the entire area has been recognized by both DTSC and the state as a tribal cultural property; the issue is not just about some areas near some facilities, but rather impacts to the whole of the area. Second, where and how does this occur? Please provide a map of where design, construction and implementation of these remedial facilities will be located. Third, please give examples of how cultural resource survey information is being used to guide siting and design.	Comment noted. PG&E will continue to outreach and work with the tribes during the design process. The first sentence will be revised to state:"Cultural resources in the area will affect design, construction and implementation of the final groundwater remedy." A map indicating where both remedial facilities and archaeological/historical sites are located will be submitted to the tribes concurrent with the 60% design. Results of the cultural resources survey of archaeological and historical properties (sites) have been uploaded into the Project GIS database. Utilizing GIS, facilities are located with avoidance of historic properties as a primary goal.	Comment and response noted. DTSC will continue to outreach and work with the tribes during the design process.	Comment and response noted. Tribal views regarding the significance of the cultural resources and values adversely affected and the importance of mitigating adverse effects on those resources and values will continue to be solicited through government to government and Section 106 consultations under the Consultation Protocol of the PA (Appendix B) and considered in the decision-making process.		See Section 2.4.7 of this BOD Report. The map indicating where both remedial facilities and archaeological/ historical sites are located was submitted to the Tribes concurrent with the 60% design, but under a separate cover.
70	HA-12b	p. 2-12, Section 2.4.7 (Cultural Resources)		Activities required by the Programmatic Agreement (PA) First bullet – The Fort Mojave Tribe and other tribes (with the exception of Hualapai Tribe) did not sign the PA document as their concerns were not adequately reflected in the PA document. Fort Mojave and other non-signatory tribes have requested of BLM to be consulted under the government–to-government trust relationship that each tribe has directly with the United States as authorized under Executive Order 13175, and numerous Federal and State law, such as National Historic Preservation Act (NHPA), American Indian Religious Freedom Act (AIRFA), etc.	PG&E defers to BLM/DOI.		Comment noted. The 36 CFR 800 regulations (implementing Section 106 of National Historic Preservation Act) are not the only basis for BLM's responsibility to consult with tribes about the actions proposed at Topock. BLM's consultation responsibilities are grounded in the trust responsibility that the federal government bears toward Indian tribes as sovereign governments, which goes back to a variety of treaties, and many laws, executive orders, regulations, presidential memoranda and judicial decisions. Recent examples include the American Indian		

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							Religious Freedom Act, the Native American Graves Protection and Repatriation Act, the Archaeological Resources Protection Act, Executive Orders 13007 and 13175, and memoranda to the executive branch issued by Presidents Clinton, Bush, and Obama. The NHPA is only one piece of the whole corpus of law and policy that drives federal agencies to consult with tribes about a wide range of tribal concerns, notably including tribal religious, spiritual and cultural values they attach to the Traditional Cultural Property/Place (TCP) in the Topock area. The BLM can only determine if an effect is adverse by consulting the tribes that ascribe significance to the TCP. It follows then, in furtherance of BLM's NHPA Section 106 responsibilities and government –to-government trust relationship, that, BLM will conduct its consultations under the Programmatic Agreement's Consultation Protocol (Appendix B) and through the implementation of the Cultural and Historic Properties Management Plan (CHPMP). Consultation will move forward with the tribes to determine if an adverse effect is anticipated for historic properties (i.e., bounded archaeological sites), as well as, for the cultural, religious, and spiritual (intangible) values tribes hold for the TCP within the APE.		

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71	HA-12c	p. 2-12, Section 2.4.7 (Cultural Resources)		Second bullet – The description of implementation of the Cultural and Historic Properties Management Plan (CHPMP) fails to mention that the document is admittedly incomplete. Many of document's sections related to tribal views/perspectives currently are either blank or do not consider or protect the interests of those tribes who ascribe concern to the Area of Potential Effects (APE), referenced in the PA and CHPMP documents. Instead the document has solely an archaeological resource focus. Even through the many years of trying to address this missing link in the Topock process with the agencies and PG&E and the many promises by the decision makers to address this flaw, sadly this remains unchanged and unresolved as this process moves forward,. The final remedy will have many effects on the Mojave people, its aboriginal lands, religious and spiritual values and continued desecration of our Holy Place, surely this significant impact should have risen to the level of grave importance in the design and eventual construction of the final remedy. Only through a complete and knowledge-based understanding from the People who continue their religion and current day practices can such a document help and guide this process in this unique and sacred area. Financial resources were not provided by or to the BLM to adequately capture and reflect these religious and cultural values associated with the cumulative and imminent effects that will be undertaken by the cleanup project. The remedy design documents should acknowledge and provide a framework to solve these missing analytical pieces in such as way as these values can be adequately and timely considered within the design process.	PG&E defers to BLM/DOI.		Comment noted. The comment made that the CHPMP has solely an archaeological resource focus is not correct, nor is the assumption that two remedy design documents (PA and CHPMP) dealing with the implementation of the NHPA Section 106 process do not provide a framework to solve missing analytical pieces in such a way as these values held for the TCP within the APE can be adequately and timely considered within the design process. Additional consultation under the Programmatic Agreement's Consultation Protocol (Appendix B) provides the framework needed to address cultural values of religious and spiritual significance. The Tribes play a pivotal role in this process as only the Tribes can define the cultural values associated with the TCP within the APE. By design the CHPMP is a "living document" that can be modified and updated, as needed, to address new information and ongoing activities related to the Undertaking. Refer to page 33 of the CHPMP, under Section 3.3 Cultural Values/ Ethnographies; see the statement, "BLM will continue to seek additional input regarding cultural values from the Tribes. A contracted study may be undertaken to gather this information and, if provided, will be included in future iterations of the CHPMP. In Section 7.2 on page 77 of the CHPMP is a statement titled, "Accommodation of Tribal Activities and Ceremonies Involving the Topock Maze/TCP that states, "The BLM will continue to work with the Tribes to identify tribal activities and ceremonies that are associated with the Topock TCP. When such activities and ceremonies are identified, BLM will consult		

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							with the Tribes and PG&E to develop treatment measures to accommodate them. Treatment measures may address scheduling of Undertaking work to accommodate ceremonial activities and to mitigate audible and visual impacts." The crux of the matter is that BLM can only determine if an effect is adverse by consulting the tribes that ascribe significance to the TCP. It follows then, in furtherance of BLM's Section 106 responsibilities that BLM can only complete its consultation under the Programmatic Agreement's Consultation Protocol by consulting with the concerned tribes to determine if an adverse effect is anticipated upon the cultural, religious, and spiritual values they hold for the TCP within the APE. If a place is determined to be a traditional cultural place, then all or part of the significance of that place is based on the intangible cultural values of the people whose traditions define the importance. Hence, the BLM, in order to determine if there is an effect to the TCP, must analyze how any given Undertaking affects intangible cultural values associated with that place. The Tribes possess this knowledge and BLM has on several occasions requested that the tribes share this knowledge to the extent that they feel comfortable in doing so, so that their cultural, religious, and spiritual intangible values associated with the TCP within the APE can be protected in a culturally appropriate manner to the maximum extent practicable given federal and state mandates to protect human health and environmental concerns.		

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72	HA-12d	p. 2-12, Section 2.4.7 (Cultural Resources)		Activities required by the Environmental Impact Report Mitigation Monitoring and Reporting Program (EIR MMRP) – As a general statement, the design document must acknowledge that FMIT was not consulted on any of the Mitigation Measures described in the reference bulleted items, nor do we understand the intent of several of the Mitigation Measures and how they are to be implemented. Regardless, the Tribe does appreciate the opportunity to be involved early on in the implementation and refinement of these measures and request to have copies of all the draft reports currently under review (i.e., the Cultural Impact Mitigation Plan (CIMP), Cultural Resources Study, Paleontological Investigation and any others to be developed in the future) provided to the Tribe. This section should be corrected to note that the Tribes, to date, have NOT been part of the CIMP development, despite the Tribes' repeated inquiries.	The bulleted items on the bottom of page 2-12 and on page 2-13 refer to mitigation measures discussed in the certified EIR. PG&E notes that mitigation measures were proposed in the Draft EIR, which was circulated for public review. The Tribe submitted substantial and lengthy comments on the Draft EIR, and it is PG&E's understanding that the Tribe also met with DTSC to discuss mitigation measures. The mitigation measures in the Final EIR were revised in response to the submitted comments from the Tribe and others. The mitigation measures will be implemented at various stages of the final remedy, and not all are required to be complete at the 30% design stage. PG&E acknowledges that the Tribe has been and will be involved in the implementation of specified measures. To date, as chronicled in Table 7-2, PG&E has engaged in numerous outreach efforts and has had many communications with the Tribes. The communications included transmitting documents such as draft disturbed area maps and the proposed methodologies for the Mature Plants and Floristic surveys. As of February 2012, the CIMP outline has been provided to and discussed with the Tribes and the Tribes will have additional future opportunities for input on its contents.	The proposed mitigation measures were provided in the Draft EIR for tribal comments. As a result of those comments, DTSC had several meetings with the Fort Mojave Indian Tribe and revised the mitigation measures for the Final EIR. Although the Fort Mojave Indian Tribe believes that DTSC did not offer sufficient discussions with the tribes on mitigation measures during its development, this is a topic of pending litigation. Please note that DTSC did require PG&E to work with interested tribes on the implementation of specific measures.	Defer response.		
73	Hualapai-35 and TRC-17			While Hualapai and other Tribes believe that the Colorado River is sacred and should be kept clean, Hualapai also believes that there should be an emphasis on protection of spiritual and cultural resources near the Topock Compressor Station. In the 30% Design report, the protection and recognition of spiritual resources was not addressed. Drillers, employees, scientists, and construction workers all must be educated regarding the spiritual importance of the area to the Tribes. If any employee exhibits outward disrespect for the spiritual importance of the area, then those employees should be removed from the project as soon as possible. The Tribes need verification that such an employee program is going to be implemented as part of the project. *[Next sentence appears only in the comment matrix]* In addition, during implementation of the project (construction/operation/maintenance), PG&E should implement and enforce a management plan that addresses human and solid waste in order to more fully protect the site. **TRC Recommendation:** This should be included within in the 60% design report discussions and plans.	Consistent with its obligations under the Programmatic Agreement's Monitoring Protocol, existing PG&E standard practice, and the EIR MMRP requirements, cultural sensitivity training is required of all staff, workers, and contractors engaged in activities within the APE to familiarize them with the sacred nature of the area so that they will perform their jobs in a respectful manner. Consistent with these obligations, PG&E will not tolerate any disrespectful behavior in the field and will remove any staff, workers, or contractors who do not comply with this section. Text will be added in the 60% design report indicating that environmental and cultural/historical resources and other tribal concerns are being considered and protected by PA, CHPMP, CIMP and EIR MMRPs.	Comment and response noted.	Comment and Response noted pending review of the 60% design submittal.		See Section 2.4.7 of this BOD Report.

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Section 3 Comments—Design Basis and Assumptions									
74	DOI-23	Section 3		DOI acknowledges that the O&M Plan will include details of the proposed monitoring network, sampling frequency, and analytical parameters; however, please include discussion of how chromate and byproduct concentrations will be monitored down gradient of the IRZ and how monitoring data will be used to evaluate system performance and affect changes to system operations (e.g. substrate dosing).	These details will be part of the draft O&M plan. Preparation of that detailed plan is underway and includes these considerations. Partial discussions will likely not provide enough detail to be satisfactory. PG&E suggests a TWG meeting prior to submittal of the plan in the 60% design that includes an agenda item focused on the monitoring plan. Preliminary details at this time would be pre-mature.	Okay pending review of the groundwater monitoring and the O&M Plan	Okay pending review of 60% design submittal, the groundwater monitoring plan and the O&M plan.	Comment resolved.	See draft O&M Manual, Volume 2 – Sampling and Monitoring Plan.
75	HA-13	p. 3-1, Section 3.1 (Summary of Modeling)		Refer to comments on Appendix B.	Comment noted.		Comments noted and addressed separately.		See Appendix B of this BOD Report.
76	DOI-24	Section 3.1/3-2/ Last Paragraph		It is unclear in the depiction on Table 3-1 whether the wells are screened in Layers 2 or 4. It is presumed that they are but the table does not clearly depict this in the column entitled "Preliminary Well Count".	Tables 3-1 through 3-4 will be clarified to better indicate screen zones in each well. Preliminary screen lengths for each model layer are provided in the column "Preliminary Screen Length". If a model layer row does not have a screen length provided in this column, the preliminary design consists of a single screen across two or more of the model layers. Note that the estimated vertical depth of each model layer is provided in the column "Model Layer Thickness". Well design, including placement of screens, screen length, etc., will be updated and detailed during the 60% and 90% designs. It should be noted, that final location and lengths of screens may be modified in the field during installation activities. Additional information regarding the design basis for individual well and aggregate flow rates will be provided the 60% design submittal, including Section 3, Appendix B, and the table footnotes. The discrepancies in the sums of flow rates result from the rounding of per-well or per-screen interval flow rates to appropriate significant digits. These discrepancies will be resolved in the 60% design submittal. Per comment #10 (DOI-9) and #232 (DOI-65), potential inclusion of the Area H well and other changes within the East Ravine will be evaluated based on the latest remedial investigation data available and included in the 60% design submittal. Information will be reflected appropriately in these tables.	Okay	Revised Tables 3-1 through 3-4 are acceptable pending review of 60% design submittal	Comment resolved.	See Tables 3.2-1 through 3.2-3, Table 3.3-1, Section 3.2, and Appendix B.

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77	DTSC-17	Page 3-2, Section 3.1 Summary of Modeling		Request adding contoured chromium plume to cross-sections (especially for B-B'). Contoured chromium maps should also be added to remedy maps to assist in evaluating remedy design.	The vertical delineation of the current chromium plume distribution can be added to the cross-section figures.	Okay		Comment resolved.	See Figures 3.1-2, 3.1-3, 3.1-4, and 3.1-6.
78	DTSC-18	Page 3-2, Section 3.2, In-situ Remediation	Second bullet	The purpose of the Inner Recirculation Loop is stated to be facilitation of groundwater flow through the IRZ. However, it is also noted in Appendix B, section 4.4.2, Riverbank Extraction that the design goal of the extraction wells were to both accelerate groundwater through the IRZ and to capture Cr(VI) located down gradient of the IRZ. DTSC also envisions that the extraction wells should be designed to capture any by-product formation that may be formed as a result of Cr(VI) reduction that would flow past the extraction wells. These goals should be consistent throughout the design document.	Text in section 3.2 will be updated to reflect that the Riverbank Extraction wells will both facilitate the groundwater flow through the IRZ and capture Cr(VI) located downgradient of the NTH IRZ. The Riverbank Extraction wells are also designed to control NTH IRZ generated byproducts in the deeper portion of the aquifer. The Riverbank wells are designed to be screened beneath the naturally occurring reducing rind to minimize negative hydraulic impacts on the reducing rind; and reduce the potential for well fouling in the Riverbank extraction wells caused by the presence of dissolved minerals in the naturally reduced groundwater in the rind. As discussed in response to comment #266 DOI-86, the riverbank extraction wells can be constructed in a manner that would allow them to be modified if observed conditions suggest it is necessary to control Cr6 migration. One approach would be to build the well so that the casing in the shallow unit could be perforated if water needed to be pumped from the shallow zone. Alternative designs will be considered and one selected and presented in the 60% design.	Okay pending review of the 60% design submittal. Please note it was DTSC's understanding prior to the 30% design that the Riverbank Extraction wells were stop gaps to capture not just Cr(VI), but also any byproduct formation from remedy that may expand toward and under the Colorado River. Currently as described, the Riverbank Extraction Wells will not have capture of the resulting by-products, This is an area of interest to stakeholders and agencies since the RAO is to ensure that the "geographic location of the target remediation area does not permanently expand following completion of the remedial action."		Comment resolved.	See Section 3.2.
79	DTSC-19	Page 3-3, Section 3.3, In-situ Remediation	First bullet of page. The stated purpose of the TCS recirculation loop is "to provide hydraulic capture of contaminated groundwater at these locations and to directly treat Cr(VI) under the TCS."	At present, the extent of contamination or the hydraulics of the TCS and East Ravine area is still under investigation. DTSC agrees that the purpose as stated is appropriate for the remedy, but the implementation of the conceptual extraction system may not be sufficient for that purpose. In addition, the measurement of that success will be unlikely for decades.	Comment noted. PG&E recognizes that the TCS and East Ravine areas are still being investigated and that as new information is gathered prior to and after remediation begins, adjustments to the system may be necessary.	Okay pending review of 60% design submittal		Comment resolved.	

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80	DTSC-20	Page 3-3, Section 3.2.1	Up to 24 injection wells (i.e., NTH IRZ injection wells) situated within 16 locations or clusters also located within the NTH IRZ, that will be used to re-inject carbon-amended water into the aquifer	It is unclear if Appendix B model runs (B-27 to B-30) are results of 75 ft spacing or revised 150 ft spacing. Also, are they running all optional wells or just the proposed 16 locations? If the model is showing Cr(VI) transport running all wells, what will be the fate of the Cr(VI) as proposed in Fig 3-1? Also, what triggers the proposed future provisional wells shown in Fig 3-1? This section should explain or at least mention upfront the provisional NTH IRZ wells that are pictured along the NTH IRZ.	Text will be clarified in the 60% design to differentiate between the 75 ft and 150 ft NTH IRZ well spacing layouts and analysis. The Appendix B model runs (B-27 to B-30) are indicative of the revised 150 ft well spacing – primarily 150 spacing with several 75-foot spaced wells near the center of the line. The flows are reflected in B-26. The provisional wells in Fig 3-1 will be clearly labeled. The need to install and activate the proposed provisional NTH IRZ wells will be based on the monitored performance of the NTH IRZ and the generated reducing zone over time. Further discussion will be included in the 60% design.	Okay, pending review of 60% design submittal		Comment resolved.	See Section 3.2.1, Figures 3.0-1 and 3.1-1, and Appendix L (O&M Manual).
81	DTSC-21	Page 3-3, Section 3.2.1	3rd bullet	The numbers of wells in most figures do not correspond to 24 wells and 16 locations. PG&E should label all figures for clarity. Note: Fig 3-1 provided well IDs, but there are only 16 injection wells. The legend for the figure suggests that those are individual wells and not wells locations. It isn't clear until Table 3-1 which provided well counts at each IRZ. This needs to be more consistent and easier to track.	The presentation and labeling of the NTH IRZ wells will be clarified in the 60% design.	Okay, pending review of 60% design submittal		Comment resolved.	See Figures 3.0-1 and 3.1-1.
82	HA-14	p. 3-3, Section 3.2.1 (National Trails Highway ...)		The locations of the NTH IRZ Extraction Wells are not specified. It is understood that these wells are components of "clusters," but the configuration of a cluster should be depicted schematically somewhere to aid in understanding of how the system operates. What information will determine whether the NTH IRZ well spacing will be at 75 or 150 feet? Will this be determined during drilling or later during start-up operations? How long will it take to make such a determination? How will the monitoring data be used to facilitate such a determination?	Additional details regarding well clusters will be provided in the 60% design documents. Initially the model will be used to select spacing; drilling will not likely lead to spacing changes unless water quality data indicates an absence of a plume, Operational data collected from MW's will be used in conjunction with operational data to determine if more wells are needed. The need for more wells will take anywhere from a few months to several years to determine and will be dependent on the natural system's response and the success of less intrusive system adjustments. A more detailed discussion of monitoring data and its application will be included in the 60% design. These details are not fully developed at this time.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Section 3.2.1.1, Table 3.2-1, and Appendix L (O&M Manual).

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PG&E Topock Compressor Station, Needles, California

Item	Comment Number*	Section/Page	Reference Text	30% Design Comment	PG&E Response to 30% Design Comment	DTSC Response to 30% Design Comment	DOI Response to 30% Design Comment	Final Comment Resolution	Where Responses are Reflected in the 60% Design Documents**
83	DTSC-22	Page 3-3, Paragraph 1, Section 3.2.1.1 Description – NTH IRZ		The paragraph starts out by stating, "The NTH IRZ Extraction Wells will be located far enough away from NTH IRZ Injection Wells to minimize the extraction of reduced water containing organic carbon or dissolved metals. " However, proposed extraction well IRZ-23 is located adjacent to injections wells on the north and south and with a similar well spacing as the rest of the IRZ line. The rationale for placing well IRZ-23 in its location should be specified in this section as should the potential for this well to capture reduced water/organic carbon/ byproducts. The basis for the range of extraction and injection well flow rates mentioned in the section should be cited. Was consideration given to having the IRZ extractors located to the south rather than north to assist with East Ravine/TCS extraction systems to the south?	The language for the NTH IRZ extraction well layout will be corrected. The three northern NTH IRZ extraction wells were positioned to minimize the number of NTH IRZ wells and offer hydraulic control of the northern low concentration end of the chromium plume. Approximately 15 different NTH IRZ well layouts and extraction/injection patterns were considered during the remedial design phase. The original design consisted of 40 wells with approximately 75 ft spacing consistent from North to South along the NTH. The well spacing and injection/extraction pattern then went through several iteration processes until the optimized NTH IRZ well layout was achieved. The NTH IRZ extraction well located in the center of the NTH IRZ line (IRZ-23) was located in this position to maintain/accentuate the eastern flow component of the groundwater. The two closest NTH IRZ injection wells (IRZ-21 and IRZ-25) are 150 ft away from IRZ-23. There is potential for fouling at this location so the monitoring program will take this into consideration. Adjustments can be made to well rates and carbon dosing in this vicinity to alleviate well fouling. Numerous well layouts and rates were considered with the groundwater flow and transport models to develop this optimized well layout. Not all scenarios were included in the design report. Consideration was given to locating the IRZ extractors to the south, however given the limited alluvial thickness in this area and the necessary injection volumes to maintain an effective NTH IRZ. Locating the NTH IRZ extractors to the north proved to be more advantageous in model simulations. Additional information will be added to the 60% design submittal.	In the response, PG&E states: "*Adjustments can be made to well rates and carbon dosing in this vicinity to alleviate well fouling.*" However, DTSC is still unclear how each of those adjustments interplays with the others. DTSC anticipates that information will be provided in the 60% design submittal.		Comment resolved.	See Section 3.2.1.1, Appendix B, and Appendix L (O&M Manual).

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84	DTSC-23	Page 3-3, Paragraph 2, 3.2.1.1 Description – NTH IRZ		The paragraph starts out by stating, "The NTH IRZ extractions wells will be constructed using up to 12-inch nominal diameter well casing with one or two screened intervals to target specific intervals of the geologic formation." Which horizons/intervals are being targeted and why?	As described in Section 3.2.5.1, the screen intervals will be chosen based on the portions of the aquifer containing contaminants requiring remediation. Preliminary screen lengths for each model layer are provided in the column "Preliminary Screen Length" in Table 3-1. The preliminary design may consist of a single screen across two or more of the model layers. Well design, including placement of screens, screen lengths, etc., will be updated and detailed during the 60% and 90% designs. It should be noted that the final placements and lengths of screens may be modified in the field during installation activities.	Okay pending review of future design submittals.		Comment resolved.	See Attachment D of Appendix C Design Bulletin (Remediation Well Design and Field Construction Approach).
85	DTSC-24	Page 3-4, Organic Carbon Substrate Amendment System (MW-20 Bench)		The section should reference figures of the proposed system.	Comment is noted. The section will reference the appropriate design drawings and may be supplemented with report figures in the 60% design submittal.	Okay		Comment resolved.	See Section 3.2 (including Section 3.2.1.1 under the heading Organic Carbon Substrate Amendment System).
86	DTSC-25	Page 3-4, Carbon substrate storage		Why did PG&E not discuss the carbon substrate storage tank(s) sizing? This should be included in the design and on P&ID. Also, PG&E highlighted the ethanol system design to minimize fire/explosion during a Hinkley site visit. As PG&E is proposing ethanol as a carbon substrate at Topock, fire/explosion design should also be discussed in the design.	Preliminary carbon substrate storage tank sizes are provided in the Appendix D Equipment List. The carbon substrate tanks located at the MW-20 Bench and Transwestern Metering Station Bench are currently planned to be approximately 20,000 gallons and 3,000 gallons, respectively. Further detail regarding the carbon substrate storage design, including sizing, will be provided in the 60% design submittal. A discussion of fire/explosion protection design requirements, especially those related to the electrical installation, is provided in Section C.4.6 of Appendix C. Additional details will be included in the 60% design submittal.	Okay, pending review of 60% design submittal		Comment resolved.	See Section 3.2.1.1 under the heading Organic Carbon Substrate Amendment System and Appendix C (Section C.5).

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87	DTSC-26	Page 3-5, Tanker Truck Unloading Pad and Portable Tanks		Tanker truck section discussed the construction of a pad to accommodate 110% of one tanker truck volume. Its design will need to be included. If this is included in a drawing, PG&E should reference its location. Similarly, the portable tanks are stated to be from 5 to 1000 gallon capacity, this is a large range. Drawings and diagrams in the final design will need to be more specific.	Comment is noted. The preliminary tanker truck unloading pad location is shown on Drawing C-9 of Appendix D. Additional pad design details will be included in the 60% design submittal. The use and design of portable tanks is provided to allow flexibility in system operation. Portable tanks for reagent delivery will be the exception not the rule. Thus, a range of 5 to 1,000 gallons is provided in the 30% design to accommodate the potential range of carbon dosages to the injection wells and uncertainties at the preliminary design phase. Additional design details regarding the portable tanks will be included in the 60% design submittal.	Okay pending review of the 60% design.		Comment resolved.	See Section 3.2.1.1 (under heading Portable Tanks) and Drawing S-06-03.
88	DTSC-27	Page 3-5, Portable Tanks		The text should elaborate on when portable tanks would be used for specific, targeted injections (How often would it occur? How many times? Where would it occur?). What is the decision point(s) for using a tank rather than installing a pipeline?	Portable tanks may be used in conjunction with substrates that are perishable (e.g., whey) and/or exhibit a long biodegradation half-life to facilitate a low volumetric dose. Portable tanks may also be preferred over pipelines at locations where the carbon injection volume is low enough, injections occur with long rest periods, or long pipelines are expected to pose health and safety, engineering design, and/or long term operation and maintenance challenges. Operational details, including the use of portable tanks for the direct injection of dilute carbon substrate solution at the wellheads, will be included in the O&M Plan. Additional design details regarding how the carbon substrate amendment system will accommodate portable tanks will also be included in the 60% design submittal.	Okay pending review of the 60% design.		Comment resolved.	See Section 3.2.1.1 (under heading Portable Tanks) and Appendix L (O&M Manual, Volumes 1 and 3).

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89	DOI-25	Section 3.2.1.1/3-5/Organic Carbon Dosing and Delivery Strategy		It is stated that substrate use will be 700 gpd based on ethanol. How different would the flow be based on lactate as the substrate? When will the substrate to be initially used be selected? Please provide an example of how monitoring data will be used to adjust carbon substrate flow rates and frequency of injections. For the example, indicate which monitoring wells would be used, what data will be reviewed, and what would be the rationale to make the adjustments.	Based on the differences in density and organic carbon content between 95% ethanol and 60% sodium lactate, 700 gpd of ethanol is equivalent to approximately 1,100 gpd of lactate. It should be noted that the 700 gpd usage rate for ethanol is a maximum rate; the nominal target rate is 100 gpd. Based on the experience and successful treatment to date, the current plan is to start-up the system with ethanol. The 60% design will discuss the performance monitoring plan, including proposed monitoring well locations, sampling frequency, and target ranges of concentrations. Typically, MWs located within the In-situ Reactive Zone (IRZ) will be used to monitor organic carbon substrate distribution downgradient of the IRZ recirculation wells. Total Organic Carbon (TOC) samples will be collected from these wells and compared to target concentration ranges. If concentrations are too high or too low, adjustments of injection concentration, duration, or frequency, injection flowrates or other operational parameters may be made.		Okay pending review of the 60% design submittal.	Comment resolved.	See Section 3.2.1.1 and Appendix L (O&M Manual, Volumes 2 and 3).
90	DTSC-28	Page 3-5, Organic Carbon Dosing and Delivery Strategy		The basis for carbon substrate flow rates as well as TOC doses should be included in this section. Pilot Test data for the site should be utilized. This comment regarding stating the basis for the design also applies to other components of the remedy (e.g., inner recirculation loop, TCS recirculation loop) Clarify if carbon is planned to be recirculated between IRZ wells as originally proposed in the CMS/FS as it now appears to be a TOC injection only scenario. Distributing carbon across the IRZ transect is of concern if recirculation is not utilized as the floodplain pilot test demonstrated minimal lateral dispersion of a reducing zone. Will IRZ wells be designed with dual screens to assist in drawing carbon outwards from IRZ wells as done in the Upland Pilot Test? Why or why not?	**Organic Carbon Dosing and Flowrate Design** A section will be added to Appendix B in the 60 percent design discussing the results of in situ pilot tests and how these results were used in deriving a target TOC concentration for the remedy and will include a discussion the design principles that were presented at the January 19, 2012 TWG meeting. Organic carbon dosing is designed to achieve sufficient lateral distribution across the spaces between injection locations. As injected water travels away from a given injection well, the organic carbon substrate is consumed. An adequate concentration in the injection solution is required to ensure that there will be sufficient organic carbon substrate to cover the spaces between in the injection points. Modeling was utilized to develop a basis for rate, concentration, and frequency of carbon substrate injection to achieve sufficient organic carbon distribution and chromium treatment. By varying these factors within the solute transport model, a balance was achieved to minimize the potential of the Cr plume migrating past the NTH IRZ. If the TOC carbon substrate	Okay pending review of the 60% design submittal.		Comment resolved.	See Section 3.2 and Appendix B.

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					concentration or the injection rate were too low, the solute transport model indicated bleed through of the Cr plume between the NTH IRZ injection wells. Similarly, if the off cycle of the remedial system was too long, the potential of the chromium plume migrating past the residual reducing zone increased. **Recirculation System Design** Several recirculation designs were discussed in the CMS/FS and considered for the NTH IRZ, including the use of dual screen wells (with injection and extraction intervals within a single location), alternating injection and extraction wells along the IRZ, and the 30% BoD proposed configuration with injection wells along the line and minimal extraction wells along the line. As the commenter indicates, one advantage of alternating injection and extraction wells or using dual screen wells is to induce cross-gradients to facilitate lateral organic carbon distribution. However, in practice it is difficult to operate such configurations without extracting organic carbon substrate or treated water; thus complicating system maintenance. For example, organic carbon distribution proved somewhat difficult with the use of dual recirculation wells in the uplands pilot test. A portion of the organic carbon substrate injected into one of the dual screened wells, PTR-1, short-circuited vertically and was extracted by the extraction interval in the same location where the substrate was injected, limiting the horizontal distribution laterally across the deep zone (i.e. to PT-8D). Similarly, difficulties were encountered when using the alternating injection and extraction well design at Hinkley. In that system, it was very difficult to distribute sufficient carbon to treat the space between injection and extraction wells without extracting organic carbon or dissolved metals in treated groundwater and the result was a discontinuous IRZ that produced fingers of treated water downgradient of the IRZ interspersed with gaps where Cr(VI) was not treated. As a result that system was reconfigured to place injection wells along the line and extraction wells on the ends and in minimal places along the line, similar to the design proposed for Topock in the 30 percent design.				

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					The currently proposed design includes continuous operation of injection wells along the IRZ, which will allow for a much greater volume injected and greater radius of influence to be achieved than with the point injections that were applied in the Floodplain pilot test. For comparison, an injection well in the proposed design that receives 20 gpm for a 6 month operational period will receive 5.2 million gallons of water, whereas PTI-1D received 60 thousand gallons in the Floodplain pilot test. A discussion of these considerations will be added to Section 3.2.1.1 on NTH Highway Extraction and Injection Wells in the 60 percent design.				
91	DTSC-29	Page 3-5, Remediation Well Maintenance System		The section indicates that well maintenance reagents could be dosed into the carbon amended groundwater conveyance piping network via the well maintenance reagent delivery systems at the MW-20 Bench. This would seem to invoke special hazardous waste piping criteria (e.g., double- lined) for certain reagents (e.g., acid washes).	As discussed in Section 3.2.5.2, piping materials will be compatible with the characteristics of the conveyed fluids, including any well maintenance reagents and double-walled piping will be used to for any fluids that are California hazardous waste.	See response to item 128.		Comment resolved.	
92	DTSC-30	Page 3-5, Remediation Well Maintenance System/Well Maintenance and Rehabilitation Reagents		The sections should indicate where remediation well maintenance procedures and details will ultimately be located.	Comment noted. Remediation well maintenance procedures and details will be included in the O&M plan to be submitted with the 60% design submittal.	Okay pending review of O&M Plan		Comment resolved.	See draft O&M Manual, Volume 1 – Operations and Maintenance Plan.
93	DOI-26	Section 3.2.1.1/3-5 and 3-6/ Remediation Well Maintenance System and Well Maintenance and Rehabilitation Reagents		The text states that chemical rehabilitation reagents may be injected at the well head and/or dosed into the carbon amended groundwater conveyance piping network. Additional discussion is required on how this will be accomplished in practice since the system is serving two different purposes. Also, please provide additional discussion regarding the affects of the proposed reagents on groundwater chemistry and the reducing environment of the IRZ.	A more detailed discussion of the chemical rehabilitation process will be included in the 60% design. Detailed protocols and safety requirements will be part of the final O&M plan. Acids and biological dispersants are the likely chemicals that will be used to rehabilitate IRZ injection wells. Acids will lower the pH of groundwater, potentially temporarily dissolving Cr(III) minerals that have formed within the screen, filter pack or aquifer within the immediate vicinity of the injection well. Cr(III) dissolved will either be removed from the well during rehabilitation or will re-precipitate as pH is buffered following rehabilitation. The biological dispersant is not expected to impact the groundwater chemistry or reducing environment of the IRZ during rehabilitation.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See draft O&M Manual, Volume 1 – Operations and Maintenance Plan.

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94	DTSC-31	Section 3.2.1.2, Design Basis – NTH IRZ, Page 3-6		Define which organic substrate will be used. PG&E state that the selection of the substrate will depend on the balance between the mode of delivery, the substrate properties and the rate of carbon utilization. When can you make assumptions to make this determination? PG&E should have enough experience and information on this critical substrate. Will the design be based on ethanol or lactate and why? Once a substrate is determined to be used, can it be substituted readily to another substrate? What would be the rationale for changing the substrate if geophysical conditions or contaminant reduction is not as successful as anticipated? In the Floodplain ISPT, the purpose was to review the efficacy of reduction without continuous injection of lactate (6 injection events) over a year in a well cluster, and in the Upland, you used a different substrate to demonstrate the efficacy of recirculation over 6 months (using 38K gallons of reagent) in two wells 140 ft apart. The two pilot tests have different parameters and goals, with different substrates. How are the results being used and related back to the remedy? PG&E should provide a discussion to tie in the pilot tests and remedy.	**Organic Carbon Substrate Selection and Implementation** As the commenter notes, the pilot tests evaluated lactate and ethanol organic carbon substrates. Both substrates have similar properties, such as degradation rates. The pilot test results demonstrated that both reagents are effective for chromium treatment. Based on the past success, level of experience, and cost effectiveness of each reagent considered, ethanol was chosen for use in the final remedy, as will be stated in the 60% design. Substrate selection may change over the lifetime of the project as substrate costing varies. In addition, other substrates, such as longer lasting substrates, could be useful for certain situations that arise over the life of the project, and as such documents written to date have preserved the option of using additional substrates. The 60% design will present the performance monitoring plan for evaluating substrate distribution and when different substrate may be needed to achieve sufficient distribution over the course of the project. To the extent possible, flexibility is being incorporated into the design to allow for changes in substrates. Modifications to system equipment, including pumps and flow meters, may be needed to change substrates from ethanol to other potential substrates such as lactate or emulsified vegetable oil. Whey would require more extensive modifications to the substrate storage and dosing infrastructure, given its perishable nature. Changing substrates would also require some system preparation activities, for example, cleaning of the storage tanks and reagent lines. **Organic Carbon Substrate Delivery Design** As the commenter notes, the pilot tests were also used to evaluate reagent delivery and to gather data necessary for full-scale reagent delivery design. With the variable volume point injections conducted in the Floodplain pilot test, the radius to volume relationship and mobile porosity were determined. These basic distribution properties were used in the transport modeling, allowing for analysis of a variety of recirculation system layouts. One of the main objectives of the Uplands pilot test was to test the ability to distribute	Okay		Comment resolved.	See Section 3.2.1.2, Appendix L (O&M Manual, Volume 3), and Appendix B.

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<tr><td></td><td></td><td></td><td></td><td></td><td>organic carbon by recirculation with recirculation wells with two screens, one used for injection and one used as extraction at each location. As discussed in the final report, the findings of the study indicated potential issues with distribution of organic carbon substrate in this recirculation design, due to vertical short circuiting between injection and extraction intervals that limited lateral distribution at the middle and deep intervals. Based on this information, the recirculation system for the final remedy does not include recirculation wells with injection and extraction intervals at the same location.

The 60% design will contain a discussion of the pilot test results and how they were used in the full-scale design.</td><td></td><td></td><td></td><td></td></tr>
<tr><td>95</td><td>Hualapai-17</td><td></td><td></td><td><u>Evaluation of First-order Rate Constants to Estimate Remedial Timeline</u>

First-order rate constants have been calculated for Cr(VI) reduction using data from the Upland ISPT. The rate constants can be used for estimating how quickly remediation goals will be met at a site. The rate constant is dependent on TOC concentration, and the Cr(VI) reduction rate constant (k) is determined graphically (Appendix A). From ISPT data, the Cr(VI) reduction rate constant ranges from k = 0.0021 d-1 for TOC =146 mg/L to k = 0.80 d-1 for TOC = 8,050 mg/L (Table 1, Figure 1). The rate Cr(VI) constant varies by two orders of magnitude. This means that the time required to remediate the plume while injecting TOC = 150 mg/L will take 381 times longer than it would take to remediate the plume using 8,050 mg/L.

Table 1. Summary of rate calculations for Cr(VI) reduction
<table>
<tr><th>ISPT Well</th><th>TOC, mg/L</th><th>First-order Rate constant k, d^{-1}</th></tr>
<tr><td>PT-9S</td><td>146</td><td>0.0021</td></tr>
<tr><td>PT-7S</td><td>896</td><td>0.0119</td></tr>
<tr><td>PT-8S</td><td>1740</td><td>0.0753</td></tr>
<tr><td>PT-7D</td><td>5430</td><td>0.3263</td></tr>
<tr><td>PT-7M</td><td>8050</td><td>0.8003</td></tr>
</table>
Data from the Upland ISPT indicates that some of the ISPT monitor wells show Cr(VI) reduction and some wells do not show Cr(VI) reduction in response to ethanol injections. Total organic carbon (TOC) injected into the groundwater system was successful in removing Cr(VI) from the aquifer in the immediate vicinity of certain wells. The wells with successful Cr(VI) removal were mostly located within 20 feet of the TOC</td><td>Kinetics and competition for organic carbon substrate

With regards to the comments on kinetics and competition, a complete response to this comment will be provided in the 60% design. Several key points that will be discussed to address the concerns raised in this comment will include:
The various factors that contribute to the rate of decrease in Cr(VI) concentrations at each location, including the size of the active microbial population and the hydraulics of mixing at locations downgradient or cross-gradient of injection points. These factors confound the first order rate coefficient analysis and can explain the variation in rates observed.
The amount of organic carbon distributed in the Uplands pilot test was greater than necessary due to the nature of the recirculation system tested, making it difficult to draw any conclusions about the relationship between the maximum concentrations observed (as noted in the comment table) and the rate of decreasing Cr(VI) concentrations. Rapid Cr(VI) reduction at locations like PT-7M, PT-7D, and MW-24A was achieved when TOC concentrations were lower than the maximum in the comment table.
As discussed at the TWG meeting, the consumption for organic carbon substrate by various electron acceptors was accounted for in the design through a kinetic model, although the model does not differentiate between</td><td>Comment and response noted.</td><td>Comment and response noted. Further evaluation will occur during the review of 60% design submittal.</td><td></td><td>See Appendix B.</td></tr>
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				injection. Wells further away from injection showed less success in Cr(VI) reduction. Chromium reduction was not successful in ISPT monitor wells where high nitrate and sulfate concentrations were present (Figure A1). In other wells where Cr(VI) removal was successful (wells showing high TOC concentrations), sulfate reduction occurred concurrent with Cr(VI) reduction (Figures A2 and A3), indicating that sulfate reduction is required to completely remove Cr(VI). Injection of TOC creates conditions suitable for sulfate reduction and formation of sulfide minerals (such as pyrite). As sulfate is being reduced, pyrite is being precipitated (probably as colloidal pyrite), and dissolved iron is not present in water samples. When the sulfate is completely consumed, dissolved iron begins to show up (Figures A2 and A3), and manganese concentrations increase dramatically due to the reductive dissolution of naturally present manganese oxides. The data indicate that sulfate and nitrate compete with Cr(VI) for reduction; therefore, it is likely that the proposed injections of low TOC concentrations (100 to 150 mg/L) will not be sufficient to fully remediate Cr(VI) in the Topock plume. The 30% Design report states that the IRZ line along the NTH IRZ will inject a nominal TOC concentration of 100 mg/L (maximum of 500 mg/L). As shown by the rate constants, these low TOC concentrations will take a longer time to remediate the plume than would higher TOC concentrations. In order to remediate the plume more quickly, an alternative may be considered where early in the remediation, high TOC concentrations are injected into the heart of the plume where the highest concentrations are located beneath and northeast of the Compressor Station. Byproducts will be generated by the injection of high TOC concentrations. During the same early periods, low TOC concentrations are injected into the NTH IRZ line in order to remediate the floodplain portion of the plume, and lower byproduct concentrations are generated using low TOC concentrations. Then as the byproducts from the heart of the plume migrate towards the Colorado River, the IRZ line can be turned into an oxidative line to prevent the byproducts from entering the river.	electron acceptors. As presented at the January 19, 2012 TWG meeting, the ISPT data demonstrates in many cases that Cr(VI) reduction occurs concurrently with other reductive processes such as nitrate, iron, and sulfate reduction and is more thermodynamically favorable than sulfate reduction. Some of these topics were discussed at the TWG meeting on January 19, 2012. A complete discussion of the data and concepts presented at the TWG meeting will be included in the detailed response to comments as part of the 60% design. In addition, there will be a discussion of the data from each monitoring location discussed in this comment, so that it is clear how all of the data was evaluated and interpreted and used to inform the current design. The possibility of using higher TOC concentrations in the higher Cr(VI) concentration areas at the Compressor Station could be considered as the system is started up and monitoring data are evaluated; but such changes will be balanced with the relative benefit in IRZ maintenance and the relative cost of by-product generation. The change of the NTH IRZ from a reductive barrier that is used to treat the Cr(VI) that is flushed through the barrier throughout the remedy to an oxidative barrier would be of limited value since the manganese generated in the heart of the plume has a very limited footprint.				

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96	Hualapai-34			Additional Technical Considerations Have horizontal wells been evaluated as a way to potentially increase the area over which carbon can be introduced into the Cr(VI) plume, without having to increase the number of wells or infrastructure?	Horizontal wells were screened out for use in this application. There would be a number of significant technical challenges with using horizontal wells for this purpose and it is unlikely that horizontal wells would outperform the series of vertical wells currently proposed. It is also unlikely that horizontal wells could be used to replace the deeper wells or the deeper screens in the dual screen injection wells due to significant challenges with constructing a deep horizontal well. An assessment of the applicability of using horizontal wells in lieu of the shallow (vertical) injection wells indicated that difficulties in construction, inherently less efficient screen designs, difficulty in well development, less efficient well performance, difficult well maintenance, and the difficulty of well replacement all make horizontal wells a poor choice for this site.	Comment and response noted.	Comment and response noted.		
97	DOI-27	Section 3.2.1.2/3-6 and 3-7/ Appendix C		The text states that multiple carbon sources may be used during remedy implementation. Please explain how operational data will be used to evaluate substrate performance and what “triggers” will be used to prompt the use of an alternative substrate during remedy implementation.	Operational data collection and how the data will be used to adjust system operations will be discussed in detail as part of the O&M plan in the 60% design. The use of alternative substrates will be included in the O&M plan.		Okay pending review of 60% design submittal.	Comment resolved.	See draft O&M Manual, Volume 1 – Operations and Maintenance Plan.
98	DTSC-32	Section 3.2.1.3, Uncertainties and Assumptions, Page 3-7		Since PG&E proposes the use of adaptive operational approach, provide a general discussion of your adaptive protocol and criteria for adapting/adjusting the system; what is your anticipated adaptive review process that was used in the in situ pilot tests and what differences and how difficult will it be to make changes in the full scale design? What are your initial design criteria, estimated flow rates, carbon concentrations, specifications for each well? Will they vary based on geochemical or other differences?	Preliminary design criteria, including carbon concentrations, estimated flow rates, and well specifications, are discussed in Section 3.2.1.1. Preliminary design flow rates are also provided in Table 3-1. Operational modifications may include adjustments to injection rates, extraction rates, and/or organic carbon loading as discussed in Section 3.2.1.3. The 60% design submittal and O&M Plan will discuss the performance criteria that will trigger modifications to the operational approach, and will present the protocol for implementing such changes.	Okay pending review of 60% design.		Comment resolved.	See Appendix L (Draft O&M Manual, Volumes 2 and 3).

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Groundwater Remedy Revised Basis of Design Report/Intermediate (60%) Design
PG&E Topock Compressor Station, Needles, California

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99	Hualapai-6			<u>Evaluation and Application of In-Situ Pilot Scale Test Results</u> Section 3.2.1.2 of the report does not appear to adequately address all the results from the pilot studies, and may suggest an incorrect conclusion from these studies. A summary description of both the upland and flood plain pilot studies should discuss not only the positive aspects of the pilot results, but highlight the uncertainties which were also revealed. For example, both ISPT studies show that 1) total organic carbon (TOC) concentrations are unevenly distributed within the IRZs, 2) there is a low overall correlation between ORP and TOC concentrations, and 3) even in the presence of high TOC and low ORP, some monitoring wells still show persistently high concentrations of Cr(VI).	In light of this comment, a discussion of the pilot test data will be included in a detailed response to comments in the 60% design document. In brief, with regard to the three comments: 1) In the Floodplain pilot test, the organic carbon substrate distribution followed a radius of influence/ injection volume relationship typical of injection into a single injection point. Locations that did not receive organic carbon were outside of the radius of influence or upgradient of the injection point. One of the main objectives of the Uplands pilot test was to test the ability to distribute organic carbon by recirculation with recirculation wells with two screens, one used for injection and one used as extraction at each location. As discussed in the final report, the findings of the study indicated potential issues with distribution of organic carbon substrate in this recirculation design, due to vertical short circuiting between injection and extraction intervals that limited lateral distribution at the middle and deep intervals. Based on this information, the recirculation system for the final remedy does not include recirculation wells with injection and extraction intervals at the same location. 2 and 3) Several factors may confound the relationship between TOC distribution, changes in ORP, and Cr(VI), such as hydrogeologic flow conditions, particularly for wells downgradient or cross-gradient of a small pilot test within a larger contaminated area, and lag time for establishment of the microbial population. In addition, as the reviewer commented in a separate comment, the measurement of ORP can be subject to interference and uncertainty which is why it is not used as a primary metric.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B.

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100	Hualapai-7 and TRC-20			<u>Evaluation and Application of In-Situ Pilot Scale Test Results</u> The statement that *"reduction of Cr(VI) from mg/L concentrations (e.g., 3.35 mg/L in April 2006) to concentrations of less than a fraction of a μg/L (e.g., 0.2 μg/L)"* while true for a subset of the ISPT wells is not true for all of the wells. Floodplain ISPT wells PT3D, PT 4D, PT5D, PT6D, PE-1, TW-2D and TW3D all maintained Cr(VI) concentrations an order of magnitude above baseline even in the presence of elevated TOC levels (up to 326 mg/L). **TRC Recommendation:** It is reasonable to expect that local-scale variations may cause requirements (such as TOC concentration) to differ along the actual IRZ line. It is anticipated that a discussion of how system monitoring and designed-in flexibility will be used to 1) identify these areas, and 2) allow for more intense treatment to produce effective chromium reduction along every segment of the IRZ.	It is agreed that there will be local variations in TOC distribution along the IRZs planned for the final remedy. The 60% design will present the performance monitoring plan for evaluating substrate distribution and modifying operations to address areas that are not receiving sufficient organic carbon substrate. With regards to the pilot test data, the distribution of TOC was governed by the radius of influence (ROI) of the injection point (i.e. higher concentrations of TOC and tracer were distributed to monitoring well locations closer to the injection point) and the hydraulic gradient (i.e. outside of the ROI, TOC was distributed to downgradient locations and not to upgradient locations). A more detailed discussion of these monitoring well trends and the reasons carbon distribution as not expected or observed at extraction wells (TW-2D, TW-3D, and PE-1) will be included in the detailed response to comments in the 60% design.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B and Appendix L (Draft O&M Manual, Volumes 2 and 3).
101	Hualapai-8 and TRC-19			<u>Evaluation and Application of In-Situ Pilot Scale Test Results</u> Chromium reduction is dependent on TOC concentration, and the oxidation- reduction potential (ORP) can be used as a surrogate to measure the effectiveness of the carbon-induced reduction. Data from well MW-24A from the Upland ISPT show that TOC concentrations of 100 to 500 mg/L were effective in achieving ORP of -200 to -250 mV necessary for Cr(VI) reduction (Figure 1). However, data from well PTR-1 show that similar TOC concentrations were not effective in that area in achieving the range of ORP needed to cause Cr(VI) reduction. (see also data plots in Appendix A). **TRC Recommendation:** This suggests aquifer heterogeneity exists which may not have been factored into the current model and suggests that local-scale heterogeneity may dominate. It is anticipated that a discussion of how the impacts of heterogeneity will be monitored for during initial startup, and how contingencies to enhance and/or modify the system may be implemented to deal with such situations.	Heterogeneity is addressed in the groundwater flow model by a variable hydraulic conductivity distribution established during the groundwater flow model calibration process. This distribution was based on observed field data and further refined through parameter estimation (PEST). Documentation with respect to the groundwater flow model is presented in CH2M HILL 2005 and 2009. Heterogeneity is also addressed in the solute transport model by simulating the system as a dual domain model. This allows for interaction between the mobile and immobile porosities. The 60 percent design will include a performance monitoring program that will address these concerns and contingency plans. In addition, the detailed response to comments will be included in the 60 percent design and will include an analysis of the relationship between TOC distribution, redox conditions and hexavalent chromium reduction, including the information presented at the January 19, 2012 TWG meeting. With regards to the pilot test data, the data referenced in this comment was collected from a recirculation well, PTR-1, which represents mixing within the well and recirculation pipeline rather than distribution and treatment in the aquifer. As such, this data should not be used to assess in situ	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B and Appendix L (O&M Manual, Volume 2 and Volume 3, Section 2.1).

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					treatment or make predictions for the full-scale system.				
102	TRC-5			Chromium data from the in-situ pilot studies (ISPT) show differing results in response to carbon injections. Some wells showed Cr(VI) reduction, and some wells did not show Cr(VI) reduction. Upland ISPT wells showed different Cr(VI) reduction rates for different TOC concentrations (Figure 1). Data from the Upland ISPT shows that nitrate (NO3) and sulfate (SO4) concentrations may be competing with Cr(VI) for reduction (Figures A1-A3). **TRC Recommendation:** This suggests aquifer heterogeneity exists which may not have been factored into the current model and suggests that local-scale heterogeneity may dominate. It is anticipated that discussions will take place regarding model updates, system monitoring, and designed-in flexibility in order to 1) identify recalcitrant areas, 2) refine the remedy time frames, and 3) allow for more intense treatment to produce effective chromium reduction along every segment of the IRZ.	Local scale aquifer heterogeneities are present in most systems. The groundwater flow model accounted for this heterogeneity by defining a hydraulic conductivity distribution based on available field data and through parameter estimation (PEST) during the groundwater flow model. Aquifer heterogeneities were accounted for in the solute transport model by simulating the model as a dual domain system with mobile and immobile porosities. The combination of a variable hydraulic conductivity distribution with dual domain aids in accounting for the heterogeneities present in the aquifer. It is agreed that there will be local variations in TOC distribution along the IRZ planned for the final remedy. The 60% design will present the performance monitoring plan for evaluating substrate distribution and modifying operations to address areas that are not receiving sufficient organic carbon substrate. With regards to the competition for electrons from ethanol by nitrate and sulfate, this has already been accounted for in the degradation rate for organic carbon used in the model. In reality, the organic carbon substrate will support reduction of a variety of electron acceptors, including nitrate and sulfate; in addition, sufficient organic carbon must be injected to achieve distribution throughout the target area. A summary of the concepts and data presented at the January 19, 2012 TWG meeting on this topic will be included in the detailed response to comments as part of the 60% design.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B and Appendix L (O&M Manual, Volumes 2 and 3).

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103	DTSC-33	Section 3.2, Uncertainties and Assumptions for most remedial components	An adaptive operational approach is described by PG&E for almost all components of the remedy to be implemented.	Although an adaptive operational approach can be employed during the remedy, PG&E must describe to readers how changes in the specifications will effect and/or impact each component of the remedy. Evaluation metrics (short term measurable performance goals) will have to be developed, which will ultimately affect the redundancy and flexibility, and/or contingency part of the design. Because of the current PG&E approach, it is difficult to make any specific comments on the design including sizing, controls, spare piping, and the P&ID, etc.)	Preliminary design criteria, including carbon concentrations, estimated flow rates, and well specifications, are discussed in Section 3.2.2.1. Preliminary design flow rates are also provided in Table 3-2. These have included both nominal values and operational ranges (i.e., maximum and minimum) for consideration in the design at this stage, which will be further developed as the design progresses. These also consider modifications that may be made during the system operation. The 60% design submittal and O&M Plan will discuss the performance criteria that will trigger modifications to the operational approach, the protocol for implementing such changes, and how elements of the system are designed to accommodate the necessary adaptability.	Okay pending review of 60% design		Comment resolved.	Appendix L (O&M Manual, Volumes 2 and 3).
104	HA-15	p. 3-7, Section 3.2.1.3 (Uncertainties and Assumptions)		This paragraph highlights the relationship between the ability to circulate organic compounds at the NTH IRZ into the floodplain area and the impact of geologic and hydrogeologic heterogeneities within the aquifer. This is an important consideration, the effect of which will remain uncertain until the start-up and operation of the remedy. In order to ascertain the impact of such an uncertainty, it will be necessary to perform monitoring at strategic locations down gradient from the NTH IRZ and to have a contingency plan for addressing the potential for contaminant breakthrough. Such information should be provided in the 60%. Has PG&E performed any simulations based on scenarios assuming hypothetical pathways with higher hydraulic conductivities and then the type of contingency that would be necessary to control such breakthroughs? The Tribe notes that at the Hinkley Site, such a breakthrough occurred along the Central Area IRZ (as discussed in the December 13, 2011, meeting at Hinkley) after 44 months of operation.[4] Has anything been learned as a result of that occurrence that might be applicable to the Topock Site? [4] PG&E, 2012. "In-Situ Reactive Zone Treatment System Overview, Hinkley Gas Compressor Station, Groundwater Remediation Project." See Slide No. 14 "Central Area Treatment System Effectiveness – 44 Months" (8/11)	Heterogeneity is addressed in the groundwater flow model by a variable hydraulic conductivity distribution established during the groundwater flow model calibration process. This distribution was based on observed field data and further refined through parameter estimation (PEST). Documentation with respect to the groundwater flow model is presented in Hill 2005 and 2009. Heterogeneity is also addressed in the solute transport model by simulating the system as a dual domain model. This allows for interaction between the mobile and immobile porosities. The monitoring program will be described in detail in the 60% design. Contingency actions will also be described in the 60% design. The gap that exists in the Hinkley Central Area IRZ barrier is not due to a breakthrough but rather the lack of adequate injection well infrastructure in a portion of the IRZ line. After attempts to fill the gap using higher flowrates and increased TOC loadings failed, a new well was installed. The latest data indicates that the gap is being filled.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B and Appendix L (O&M Manual, Volume 2 and Volume 3, Section 2.1).
105	DOI-28	Section 3.2.2/3-7/ 1st Paragraph		The CMI/RD Work Plan also indicates that the inner recirculation loop provides secondary protection for the Colorado River by controlling the migration of byproducts generated by the IRZ. Please add this discussion.	This discussion will be added as a section in the 60% design submittal.	Okay pending review of 60% design submittal	Okay pending review of 60% design submittal.	Comment resolved.	See Section 3.2.2 and Appendix B.

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106	DTSC-34	Page 3-7, Section 3.2.2 Inner Recirculation Loop		The Inner Recirculation Loop (IRL) is stated to include four carbon-amended injection wells installed near the western margin of the groundwater plume north of I-40, yet some of these wells are not planned as carbon-amended wells and Table 3-4 suggests that all may be freshwater injection wells at some point in time. This section should clarify this issue.	Text will be updated to clarify the operation of the Inner Recirculation Loop wells. The current proposed layout has the northern 2 IRL injection wells receiving water from the Riverbank Extraction wells. The system is modeled without carbon amendment based on the projected chromium concentration from the Riverbank extraction wells; but the system is capable of delivering reagent to the Riverbank flow stream if Cr6 exceeds the target cleanup goal. The 2 southern IRL injection wells are simulated as freshwater injection wells. It is proposed that the IRL layout be flexible to potentially oscillate between freshwater and riverbank extraction water sources to alleviate potential byproduct impacts. Please also see RTC#262 (DOI-84). Additional details will be provided in the 60% design.	Okay pending review of 60% design submittal		Comment resolved.	See Section 3.2.2.
107	DTSC-35	Page 3-7, Section 3.2.2.1 Description – Inner Recirculation Loop		The rationale for having three to five of the River Bank Extraction Wells operated at any given time should be included in this section as should the criteria that would guide one to increase or decrease extraction rates.	This rationale will be included in the 60% design. It will include consideration of the need to: capture potential Cr(VI) concentrations located downgradient of the NTH IRZ, control IRZ by-product migration, accelerate the remediation timeframe through enhanced gradients, and minimize the effects of riverbank extraction on development and maintenance of the NTH IRZ . Monitoring wells will be used to help monitor the effectiveness of the NTH IRZ, and help determine the ideal Riverbank Extraction well pattern to maintain an appropriate balance of these operational goals.	Okay pending review of the 60% design submittal		Comment resolved.	See Section 3.2.2.1 and Appendix L (O&M Manual, Volume 2).

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108	HA-16	p. 3-7, Section 3.2.2.1 (Description – Inner Recirculation Loop)		"River Bank Extraction Wells" This section generally describes the design of the River Bank Extraction Wells, indicating that these 12-inch wells may have two discrete screened intervals. Where will these be screened relative to the natural reductive zone in the rind of the fluvial sediments? What will determine whether one or two intervals are screened? While Table 3-2 indicates a maximum extraction rate of 500 gpm, it appears that the maximum capacity could be 850 gpm total. Is this rate of extraction consistent with the design? Are there any scenarios whereby contaminated groundwater upgradient from the River Bank Extraction Wells could either breakthrough, migrate around, or otherwise escape capture by the River Bank Wells? "Carbon-Amended Injection Wells" – Will injected freshwater also be amended with carbon prior to injection to facilitate chromium reduction?	The river bank extraction wells will be screened in Model Layers 3 and 4. Care will be taken to ensure that the extraction well screens do not intersect the natural reducing zone. No more than two screened intervals are included in any one well. The need for more than one screen is based on a maximum screen length of 40 feet. Refer to Table 3-1. Section 3.2.2.1 indicates that the expected total average river bank extraction flow rate is 150 gpm (based on the individual nominal extraction rates), and that there will be flexibility to increase this flow rate to 500 gpm. Although the sum of individual design capacities is 850 gpm, it must be noted that all the extraction wells will not be operating at full capacity at any given time. This data is consistent with the design of the extraction wells. Based on the projected operation of the system and the model results, breakthrough is not anticipated. The fresh water injection is planned for areas outside the plume and therefore the system does not include a carbon amendment.	Comment and response noted.	Comment and response noted.		
109	DOI-29	Section 3.2.2./3-8/ 21st Paragraph/last line		Add that amendment with carbon will occur if extracted flood plain groundwater chromate concentrations increase above the cleanup level.	This detail will be added to this section in the 60% design submittal.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See Section 3.2.2.1.
110	DTSC-36	Page 3-8, Carbon-Amended Injection Wells		The section indicates that the target dosage concentration for flow from the River Bank Extraction Wells is between zero and 50 mg/L of TOC and that TOC may be added to facilitate treatment of Cr(VI). The basis for the target dose and criteria for adding more (or less) TOC should be clearly explained in this section.	The rationale for this concentration range will be added to this section in the 60 % design. Low concentrations of organic carbon were planned for the carbon amended injection wells in the event that Cr(VI) is extracted at concentrations that require treatment. The low end of the range, 0 mg/L, was included in case Cr(VI) is not present in extracted water and in-situ treatment is not required. The maximum concentration of Cr(VI) anticipated based on modeling results is 13 ppb, below the background concentration of 32 ppb, indicating that treatment of this water is not likely required. Should Cr(VI) treatment be required, low concentrations of organic carbon will be added. Once the reducing zone is established, a low concentration of organic carbon would be required to consume the dissolved oxygen, nitrate, and chromium and to promote iron reduction for potential abiotic reduction of Cr(VI). For reference, approximately 3.4 mg/L of TOC from ethanol would be required to reduce 8 mg/L of oxygen, 2 mg/L nitrate as N, 13 ppb Cr(VI). The upper end of the range was	Okay pending review of 60% design		Comment resolved.	See Section 3.2.2.1.

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					established above this concentration to allow for additional consumption of TOC for cell growth, promotion of reducing conditions in the subsurface, and to accommodate for uncertainties in field implementation.				
111	DTSC-37	Page 3-8, Remediation Well Maintenance System		The rationale for operating the backwash pumps at two times the injection flow rates should be stated in this section. Would another rate be better? May different rates be employed based on responses at specific wells?	The proposed backwashing rate is based on experience gained from the operation of Aquifer Storage and Recovery systems. Backwashing is currently being evaluated on an IRZ well at the Hinkley Compressor Station. Preliminary operating data from Hinkley indicates that backwashing effectively prolongs the injection capacity of the IRZ well. Flexibility in the system operation is planned to allow for variable flows and frequency of backwashing based on system performance. Additional details regarding the backwashing rate and performance criteria for potential in-field adjustments will be addressed in the 60% design submittal and/or the O&M Plan.	Okay pending review of 60% design and O&M Plan		Comment resolved.	See Section 3.2.2.1 and Appendix L (O&M Manual, Volumes 1 and 2).
112	DTSC-38	Section 3.2.2.1, Carbon Amended Injection Wells, Page 3-8		What is the basis for the 50 mg/L? Would it be the same quantity regardless of substrate used? Will the injection rates vary by area or well? What are the rationale for this design?	See the response to comment 110 (DTSC-36) on the basis for the 50 mg/L upper bound on TOC concentrations. The stoichiometry discussed in that response was based on ethanol and would vary slightly if based on lactate (for the example given 5.1 mg/L of TOC from lactate would be required, compared to 3.4 mg/L of TOC from ethanol). This variation is small in comparison with the variability of field conditions. Injection rates and/or TOC concentration may be varied based on area or individual wells. Performance monitoring data will be used to inform the need for changes in the field.	DTSC assumes this to be part of the O&M plan. Okay pending review of future plan.		Comment resolved.	See Section 3.2.2.1 and Appendix L (O&M Manual).

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113	DTSC-39	Section 3.2.2.1, Remediation Well Maintenance System, Page 3-8		What is the fouling rate anticipated based on historical knowledge?	As discussed in Section 3.2.4.3, to date, no significant fouling has been observed in the pilot IRZ system injection wells at Topock. This may be related to the batch injection configuration used in the Floodplain pilot (limited flow of nutrients through the screen), and the high-concentration ethanol solution used in the Uplands pilot (doubles as a biocide inside the well and related piping). It is also likely that the limited duration of the pilot studies may not have allowed adequate time for fouling to occur to a degree that it impacted operations; however, a longer duration full-scale system will likely have to deal with well fouling. The proposed frequency of well maintenance (e.g. backwashing on a weekly basis) was based on fouling rates observed during the Hinkley pilot test and other full scale experience. More detail regarding the well maintenance program will be included in the 60% design submittal and the O&M Plan.	Okay, pending review of 60% design and O&M Plan		Comment resolved.	See Appendix L (O&M Manual, Volume 1).
114	HA-17	p. 3-8, Section 3.2.2.2 (Design Basis – Inner Recirculation Loop)		On January 9, 2012, PG&E conducted a site walk for tribal participants to examine proposed sites for the inner recirculation loop and other proposed facilities. The Tribe's conclusions with regard to the proposed sites are presented as Attachment B to this comment letter. Of further concern is the siting of monitor well(s) associated with the inner recirculation loop as referred to in Section 3.2.2.3. Once the monitoring network is proposed as part of the 60% BOD, the Tribe requests a site walk to evaluate the acceptability of proposed monitoring sites and will provide comments on the acceptability of the locations proposed.	The Tribe's request for a site walk of proposed monitoring well locations, is noted. PG&E will contact the FMIT and other interested Tribes once the logistics for the site walk are determined.	Comment and response noted.	Comment and response noted.		At the Tribe's request, PG&E held a site walk of the proposed monitoring well locations on July 19, 2012. On July 27, 2012, PG&E received a letter from Dr. Leo Leonhart, on behalf of the FMIT, expressing appreciation for the site walk and documenting various discussions exchanged in the field. The monitoring well network is discussed throughout this BOD report and in draft O&M Manual, Volume 2 (Sampling and Monitoring Plan).
115	DTSC-40	Page 3-9, Section 3.2.3, TCS Recirculation Loop		The TCS recirculation loop will use both the RAV-EXT 1-4 wells and the MID-EX 1-4 wells. It is unclear how balance can be achieved from the COMP-INJ wells.	Text will be clarified and updated in the 60% design report. The nominal extraction rate for the East Ravine wells is 2 gpm, and the nominal extraction rate of the Northeast of TCS Extraction wells is 19 gpm. Therefore by combining the aforementioned extraction rates the nominal TCS injection rate is 21 gpm. The COMP-INJ wells are expected to be more than adequate for this injection rate.	Okay pending review of the 60% design submittal		Comment resolved.	See Section 3.2.3.1 and Table 3.2-3.

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116	DTSC-41	Page 3-9, Section 3.2.3.1 Description–TCS Recirculation Loop Extraction Wells Northeast of the Compressor Station		The section indicates that four extraction wells are anticipated. The section should indicate what would cause the number of extraction wells to increase or decrease. Also see similar comments regarding the basis for flow rates.	The well quantity, spacing, and flow rates were based on the simulated aquifer thickness and associated hydrogeologic characteristics. This system layout and operation was optimized using the groundwater flow and solute transport model. Based on the groundwater flow and solute transport model, the 4 extraction wells in the embayment area operating at a total of 19 gpm were sufficient to hydraulically contain this vicinity. Characterization of this area is primarily defined by MW-59, and there are limited other wells in this vicinity. Installation of the 4 proposed extraction wells will assist in refining the understanding of the hydrogeology of this area. If the aquifer conditions are different than anticipated, the number of extraction wells may need to be adjusted to achieve the desired hydraulic control in this area.	DTSC anticipates additional information (e.g., goal of the recirculation loop, hydraulic and water quality monitoring) to be provided in the 60% design and the draft O&M Manual.		Comment resolved.	See Section 3.2.3.1 and Appendix L (O&M Manual).
117	DTSC-42	Page 3-9, East Ravine Extraction Wells		This section should discuss how the East Ravine remedial approach has changed overtime. The basis for the following statement from the 2009 CMS/FS should be stated in this section, “Initial estimates are that approximately 15 wells, pumping a combined total of up to 10 gallons per minute, would be required to provide hydraulic capture of the area of Cr(VI) in East Ravine bedrock.” The East Ravine extraction system is now proposed to contain four wells pumping two gpm total.	A short discussion of the evolution of the East Ravine design will be added to this section of the 60% design. Data from the ongoing East Ravine groundwater investigation will also be discussed.	Okay pending review of the 60% design and draft O&M Manual		Comment resolved.	See Sections 3.2.3.1 and 2.1.2 and Appendix L (O&M Manual).
118	DTSC-43	Page 3-10, TCS Injection Wells		Based on TCS Injection well locations, DTSC is concerned that westward flow from these wells could push highly contaminated groundwater to the west in an uncontrolled manner. Note that freshwater injection wells to the north are located a significant distance away and that FW-INJ-4, located to the south, is pumping the smallest volume of freshwater. The section should indicate how this issue is being dealt with and, more importantly, how it will be addressed through groundwater monitoring and specific contingency protocols.	This was a critical consideration in the 30% design evaluation. Based on the modeling completed, the potential for westward flow is mitigated by injecting into FW-INJ-4. Although there are not any freshwater injection wells located directly to the west of the TCS injection wells, FW-INJ-4 (50 gpm) injects at more than double the rate than the combined TCS injection rate (21 gpm). This excess injection outside the footprint of the plume combined with the natural eastward flow gradient results in minimal westward flow near the TCS Injection wells. The groundwater flow and solute transport models indicate this eastward flow is maintained. The monitoring and contingency planning will be provided in the draft O&M Manual.	Okay pending review of 60% design and draft O&M Manual		Comment resolved.	See Section 3.2.3.1 and Appendix L (O&M Manual, Volume 2 and Volume 3, Section 2.1).

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119	HA-18	p. 3-11, Section 3.2.2.3 (Uncertainties and Assumptions – TCS Recirculation Loop)		This section indicates that "Construction and cultural resources constraints may affect the design and operation ...." The Tribe would like to discuss specifics as to what parts of the design and operation are thought by PG&E or the Agencies to have been, or will foreseeably be, constrained by cultural resource considerations and the anticipated cost/schedule/performance impact of any such constraints.	The intention of this sentence was to explain that during the design, various constraints will be considered to avoid impacts. There are many elements of the system design – location of facilities, infrastructure, system profiles, etc, that were – and may be further - adjusted to accommodate the site constraints.	Comment and response noted.	Comment and response noted.		
120	DOI-30	Sections 3.2.3.1 and 3.2.3.2		The discussion contained within these two sections regarding the East Ravine Extraction Wells and Design Basis must be revised to reflect uncertainties in bedrock flow conditions resulting from the recent discovery of higher fracture flow conditions at Site H. (See General Comment 9) Given this, the discussion regarding the extraction wells in Section 3.2.3.1 must note that new information from the second phase of the investigation was not fully considered in the 30% design and it therefore can only be assumed that the groundwater production and radius of influence of the East Ravine Extraction Wells will be small. Consideration should be given to further evaluation and possible modification of the East Ravine bedrock remedy in the intermediate (60%) design. It is also recommended that the text in Section 3.2.3.2 be revised as follows: "Investigation of the East Ravine area has been conducted in two phases. The sustainable purge rates of wells drilled during the first phase were low, resulting in a preliminary conceptual model of a fracture flow system with limited interconnectivity and flow volume that was used as the basis for the 30% design. More recently during the second phase, one well location (Site H/ MW-70) exhibited relatively high extraction rates. At the time of the 30% design, it is unknown whether the conditions observed at Site H are isolated or represent potentially higher flow conditions than previously conceptualized for the East Ravine bedrock. ..."	The recently collected data was not considered in the 30% design, but will be included in the assessment and revisions to the system design as reported in the 60% design document. Any new information collected subsequent to the 60% design will be incorporated into the 90% design.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See Section 3.2.3.2.
121	DTSC-44	Page 3-11, Section 3.2.3.2 Design Basis– TCS Recirculation Loop		Maps with the extent of contamination should be included in the document to ensure the extent of the East Ravine plume is defined and to aid in evaluating that the remedy will clean up that portion of the plume.	Comment noted. Figures 2-3a through c depict the approximate extent of the CrVI plume.	Okay pending review of revised figures.		Comment resolved.	See Figure 2.2-1 of this BOD Report.
122	DTSC-45	Page 3-11, Paragraph 2, Section 3.2.3.2 Design Basis– TCS Recirculation Loop		The section indicates that sustainable purge rates of wells drilled during the first phase were too low for injection to be a viable remedial alternative. The basis for this statement should be included in the section as should the second phase data which did identify a higher permeability zone in bedrock.	Comment noted. This section o the 60% design document will include a discussion of the basis of this statement as well as a consideration of recent data collected in the ER/TCS investigation. Also please see response to RTC#10 (DOI-9).	Okay pending review of 60% design submittal.		Comment resolved.	See Section 3.2.3.2.

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123	DOI-31	Section 3.2.4.1/3-11/ 1st Paragraph		The operation of the CIP system requires more discussion. How often will the CIP system be used as this will require shutdown of substrate amended water injection? How much wastewater will it generate? The wastewater flow is not identified in Exhibits 3-5 or 3-7. How does it use the pumps, tanks, and metering equipment of the substrate amendment system?	Current experience with CIP systems for groundwater conveyance piping indicates that circulating a reagent amended water in a recirculation loop is an effective preventive maintenance solution to address problematic scale deposits. The reagents used are those categories of water treatment chemicals approved for use in drinking water systems. Ultimate selection of an effective reagent(s) will require bench-scale testing of actual scale deposits. Operation of the CIP system is expected to occur on an annual basis, but possible as little as once every five years. Operation of the CIP will take place over a limited period of time and be scheduled to take advantage of system shutdown periods. The volume of spent solution is expected to be roughly 10,000 to 40,000 gallons per event. The carbon amended water injection will be temporarily shut off during the CIP event (groundwater extraction will cease and clean water will be used to flush the lines). Each conveyance forcemain will be valved to isolate the wells and create a loop with its associated spare conveyance header which will originate and terminate with the CIP Tank (frac tank). Fresh water will be added to the CIP tank and amendments will be added (per the recommended recipe based on the testing program from the scale deposit samples). The CIP system will operate by recirculating the amended water in a loop. Upon completion, freshwater will be added to flush the lines. The conveyance lines will be valved to facilitate normal operation upon completion of the CIP program.	Okay pending review of 60% design submittal.	Okay pending review of the 60% design submittal.	Comment resolved.	See Section 3.2.4.1 and Appendix L (O&M Manual, Volume 1, Section 5.1).

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124	DOI-32	Section 3.2.5.2/3-13/ 2nd Paragraph/2nd to last sentence		In all likelihood, first flush well rehabilitation water and possible CIP wastewater will have a pH less than 2, rendering it a characteristically corrosive hazardous waste. This would require double walled piping in wastewater transfer lines potentially everywhere. This requires more discussion.	The spent CIP solution will be considered a corrosive material (EPA hazardous waste number D002 [per 40 CFR 261.22]) at a pH less than or equal to 2 or greater than or equal to 12. Bench-test conducted on scale deposits would be conducted to determine suitable amendments and determine the pH of spent solution. An operational constraint that the neat (as-applied) amendment solution exhibit a pH greater than 2 or less than 12 will be considered. Acids have been used for decades in well rehabilitation. Acids are used to dissolve mineral precipitates on the well screen and in the nearby formation like calcium carbonate and sulfate, magnesium hydroxide, iron and manganese oxide, phosphates, silicates, and, of course, mixtures of all of these during well rehabilitation. Of those listed, the carbonates are the most easily dissolved with the resulting release of carbon dioxide. A simple example would be the action of hydrochloric acid on calcite (calcium carbonate). In this reaction, the acid HCl breaks apart the calcite, (CaCO3) into the salt (CaCl2) and carbonic acid (H2CO3) which further breaks down into water (HOH) and carbon dioxide (CO2), which bubbles off. This reaction is carried out by most mineral acids against carbonate deposits and accounts for the rapid evolution of gas during cleaning of wells with this type of deposit. The well water pH is measured as an indication that the acid has reacted with the encrustation to the degree that the acidity of the solution had been lost and all possible reaction has been completed. At the PGE Hinkley Compressor Station, well rehabilitation amendments are added to the well and allowed to loosen scale and deposits for a period of 12 to 72 hours. The pH is measured and verified to be above 2, before the first well volumes are pumped from the well (e.g., first flush). This operational approach will be an option. A second option is as follows, first flush rehabilitation water will be pumped out of the well with a temporary rehabilitation pump through temporary piping, pH neutralized using a permitted mobile treatment unit (if needed), and contained in temporary tanks located near the wellhead. All temporary tanks and piping, as well as the area surrounding the wellhead, will have adequate spill containment.		Okay pending review of 60% design submittal.	Comment resolved.	See Sections 3.2.4 and 3.2.5.2.

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125	HA-19	p. 3-12, Section 3.2.5 (General Design Elements – In Situ Remediation)		General design considerations for the in-situ components as well as all other components of the remedy that involve well construction should consider the eventual need to decommission these intrusive facilities. As mentioned earlier, the Tribe has entered into discussions with PG&E, DTSC, and DOI and other stakeholders in regard to considerations for well decommissioning that would be preferred in deference to the sacred landscape within which these facilities have been or will be constructed. Comments with regard to infrastructure siting alternatives in Attachment B provide further rationale supporting preferences of the FMIT Tribal Community.	The design will take into consideration the component life-cycles and eventual decommissioning process for each element of the remedial system. The design will adhere to any agreements made regarding well and system decommissioning. PG&E will draft a Decommissioning Plan for Remedy Facilities and Restoration, and the Tribes will be consulted prior to the decommissioning of any remediation facility.	Comment and response noted.	Comment and response noted.		
126	DTSC-46	Page 3-12, 3.2.5.1 IRZ Well Design, Number of Wells per Location	In areas with greater saturated thickness within the NTH IRZ, a two well cluster will be employed to facilitate recirculation of groundwater and carbon through the target zone.	Clarity is needed for design of injection wells. Is this saying there will be recirculation between wells or simply recirculation within the inner loop? PG&E has conducted a pilot test using dual screen recirculation wells to increase the reach of carbon dosing. However, the drawings and descriptions are not clear how PG&E intends to run these systems.	A dual screen well will be employed if the saturated thickness exceeds 40 to 100 feet and two screens are necessary to ensure targeted distribution of substrate in each zone. A well cluster will be employed if more than two well screens are required to provide full coverage of the target contaminated zone at locations where the vertical aquifer thickness is more than 110 feet thick. The purpose of the multiple wells per location is to ensure adequate discrete control of the injection fluid into the formation not to promote recirculation within the well cluster.	Okay		Comment resolved.	See Section 3.2.5.1.
127	DTSC-47	Page 3-12, Casing and screen material and type		The section should comment on long term corrosion issues (especially in high TDS waters) as well as fouling issues that may be dependent on the type of casing/screen material selected (also see page 3-13, paragraph 2 of Section 3.2.5.2). Will cathodic protection be utilized?	Comment noted. The 60% design will include a more detailed discussion of materials of construction for the extraction and injection wells.	Okay pending review of 60% design		Comment resolved.	See Sections 3.2.1.1 (under heading Well Maintenance and Rehabilitation Reagents) and Section 3.2.5.1, and Appendix L (O&M Manual, Volume 1).

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128	DTSC-48	Page 3-13, Section 3.2.5.2, IRZ Pipeline Design and Operation	Piping will be single-walled unless it is used to convey: (1) groundwater or remedy - produced water that is California hazardous waste; or (2) concentrated carbon substrate. In these cases, double-walled piping will be used.	Where are the areas that PG&E anticipates to encounter California Hazardous Waste and concentrated carbon substrates? In reviewing the design document, it would appear that PG&E does not believe there will be any California Hazardous Waste and little, if any, of concentrated carbon substrate transference. DTSC believes PG&E should, in addition to the current proposal, use double walled piping for management of any untreated extracted water to protect against leaks due to the cultural sensitivity of the area as well as the possibility of contamination that could be leached from the soils, which have not been completely investigated, to the groundwater.	Based on modeling, groundwater with Cr>5 ppm could be extracted from the IRZ extraction well, IRZ-23. Additional information about the subsurface conditions will be obtained as we start to install remediation wells. With regards to the suggested use of double walled piping for management of extracted water (that are below hazardous waste characteristic level) to protect against leaks due to concerns over the possibility of contamination leaching from the soils (which have not been investigated) to the groundwater, it should be noted that soil data do exist for the AOCs that overlap with the remedy infrastructure as shown in Figure 2-15. Supplemental soil sampling is being planned to complete the soil investigation and current schedule shows completion of the investigation prior to the start of groundwater remedy construction. Further, baseline soil samples will be collected to document baseline site conditions at the time of remedy construction. In addition, the overlapped AOCs are located within the plume footprint for which an active remediation will be implemented for decades. Additional evaluation of the potential for leaks and methods of leak detection and control will be performed and included in the 60% design.	Okay pending review of the evaluation in the 60% design		Comment resolved.	See Appendix C (Design Criteria).
129	DTSC-49	Page 3-13, Section 3.2.5.3, Flexibility and Redundancy		PG&E has proposed in Figure 3-1 many “provisional wells” along the IRZ, however, there are no rationale for these wells, nor are they mentioned in this section or part of the design discussion in 3.2.5. If these wells are proposed as provisional wells, they should be discussed.	Additional details regarding the purpose and locations of provisional wells will be clarified in the 60% design submittal.	Okay pending review of 60% design		Comment resolved.	See Sections 3.2.2, 3.2.3.1, and 3.2.5.3, and Appendix L (O&M Manual, Volumes 2 and 3).
130	DOI-33	Section 3.3/entire section		There is limited discussion of monitoring the fresh water supply for water quality indicators during remedy implementation. Please provide additional discussion of how the fresh water supply will be monitored (i.e. frequency, water quality parameters) to ensure that the water quality remains suitable for use.	The forthcoming O&M plan will include a monitoring plan for the final remedy, which will include discussion of monitoring for the fresh water source.		Okay pending review of O&M plan as part of the 60% design submittal.	Comment resolved.	See draft O&M Manual, Volume 2 – Sampling and Monitoring Plan (Section 5.2, Monitoring of Freshwater Supply Source).

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131	HA-20	p. 3-14, Section 3.3 (Freshwater Supply)		The discussion in this section and on Exhibit 3-3 indicates that in consideration of alternative locations for a freshwater extraction well, a location in the Park Moabi area was ruled out largely on the basis that its hydraulic influence would adversely affect the remedy. This begs a question as to the impact of a potential future private well offsite. What type of assessment was done to consider such a scenario? Additionally, please refer to comments of the TRC regarding the need to consider an alternative freshwater supply for the upgradient injection.	As described in Section 5 (Institutional Controls), model simulations were conducted to determine how close a private well would have to be in order to adversely affect the hydraulic performance of the remedy. Institutional controls are proposed for the area shown on Figure 5-1, to prevent private wells from being built within the area where pumping might adversely influence the remedy. In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Noted pending review of tech memo.	Noted pending review of tech memo.		See Appendix J of this BOD Report.
132	DTSC-50	General Comment on Section 3.3, Freshwater Supply		It is important that PG&E provides a rational and logical decision matrix for the freshwater supply. The decision should be based on objective data and reasoning which would layout and balance the pros and cons associated with each of the three potential freshwater sources prior to selection of the preferred source. The comments below highlight DTSC's issues associated with PG&E's conclusion and should be carefully evaluated and modified for the 60% design.	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Appendix J of this BOD Report.
133	DTSC-51	Page 3-14, 1st bullet	(e.g., a spare header for the conveyance of carbon amended groundwater).	A spare header is mentioned, but they are not reflected in the P&ID. Similar issue for the Clean In Place system.	Comment is noted. Spare headers will be called out in the P&IDs in the 60% and 90% submittals.	Okay pending review of future P&IDs		Comment resolved.	See Appendix D.
134	DTSC-52	Page 3-14, Section 3.3.1, Freshwater Supply Sources		The section introduces potential sources of freshwater supply for the remedial project and favors the HNWR-1 Arizona well and disfavors a California well or river source. Limitations of the California well or river source are summarized, however, limitations associated with the Arizona well are absent. Limitations/drawbacks of the Arizona well must also be mentioned in this section (e.g., excessive pipeline infrastructure, adverse water quality [arsenic, chromium], additional hydraulic effect that could send byproducts or chromium further into Arizona). As indicated previously, PG&E needs to prepare a comprehensive list of all water wells in the Topock area. The water quality of the wells should be tabulated and summarized. Exhibit 3-1 should be updated with this information. The exhibit should also include river water data for comparative purposes. Discussion with community members has indicated that water supply wells exist at the Topock Marina area adjacent to the I-40. If community member information is correct, these wells have not been identified in previous PG&E reports provided to DTSC. Although DTSC agrees with PG&E's criteria for evaluating freshwater supply options, PG&E has not provided sufficient data to suggest that the	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Appendix J of this BOD Report.

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				HNWR-1 well to be the overall superior option. While PG&E argues that using an existing well would avoid disturbance, it fails to account for the extra miles of additional piping which must be trenched and installed outside of an area that is considered the project area. Equally important is that PG&E's current knowledge of the HNWR-1 well is that there are elevated levels of arsenic beyond the MCL, and hexavalent chromium concentrations above the localized concentrations which will be injected into California. Exhibit 3-3 states that "River water is low in dissolved solids, but contains suspended solids, microbes, and trace contaminants, such as perchlorate, pesticides, herbicides, and pharmaceutical compounds. River water could not be injected without conditioning." DTSC currently does not have data suggesting that there are elevated concentrations of the suggested contaminants found within the river water within the project area. The basis for such a statement has not been established. Furthermore, the design document should indicate if disinfection would truly be needed. Will conventional well water require filtration or disinfection? What specific analyses and criteria will be conducted to determine if disinfection and filtration are necessary? DTSC understands that PG&E currently has in-line filters for the water imported from wells Topock 2 and 3. Is the necessary conditioning system similar? The document should respond to these issues. Exhibit 3-3 continues with "Construction of a river intake structure or subsurface infiltration gallery would be likely result in more disturbance than drilling of a well. Depending on where the intake was located, the length of buried pipeline could [be] less than for either of the other two options. Additional disturbance associate with potential conditioning plant construction." DTSC agrees that the needed pipeline WILL be less than for either options. PG&E also states that "much of the river intake construction disturbance could be mitigated if permission could be obtained to mount the river intake from the I-40 or the railroad bridge." Given that statement, PG&E has not demonstrated to DTSC that this design is infeasible, especially for similar design at pipeline bridges. This section also mentions that groundwater in the shallow zone from a "river well" beneath the river would contain water that is geochemically reduced with elevated concentrations of iron and manganese, which could foul the injection wells. First, isn't this issue already a concern for amended injection wells. Won't river bank extraction wells also eventually exhibit reducing					

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				conditions and potentially foul or foul injectors and therefore require a conditioning system? Could the "river well" be designed to preferentially filter oxic water from the river and minimize concerns with reduced water? The document should conduct an in-depth evaluation of the different systems that could be utilized for designing a direct river intake that would minimize or eliminate filtration concerns (e.g., Can a manufactured filter pack be placed over the inlet screen to the intake). What range of filtration systems could be designed to accommodate the remedy? Does infrastructure currently exist for importing water to the station or near the station from a water supplier or alternative source? Can blending water sources be considered to address limitations and utilize strengths of the different options? PG&E must provide a balanced evaluation considering the adverse impacts of the groundwater based on current understanding of the water quality from HNWR-1.					
135	DTSC-53	Page 3-14, section 3.3.1 Freshwater Supply Sources	In addition, pumping freshwater from this area [at Park Moabi] would have an adverse effect on the performance of the remedy.	The section indicates that pumping 600 gpm from a well near Moabi Regional Park would decrease the flux across the IRZ line by about 7%. The report should quantify the significance of this flux decrease. Furthermore, this amount has not been substantiated with the model. Would river leakage mute adverse hydraulic effects if a Park Moabi well was put near the river or on the Park Moabi peninsula? Is this properly accounted for in the model? Furthermore, this amount of change should be easily alleviated by proper engineering of hydraulic movement which PG&E did not discuss. The section concludes by stating, "Because pumping freshwater from a hypothetical well near Moabi Regional Park well PM-03 or an area closer to the Compressor Station would have an adverse effect on remedy performance, the preferred option with respect to this criterion is to pump freshwater from a well in Arizona or from the river." The section should state how far north or west (or east) of Park Moabi a well would need to be located to have minimal adverse effect on remedy performance.	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Appendix J of this BOD Report.

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136	Hualapai-24			Water Rights for Fresh Water Wells The source of fresh water for the Topock project is planned to be supplied from one or more wells located in Arizona. The water rights and legal points of diversion for these wells must be presented to the Tribes to prove that PG&E can lawfully divert water from the Mojave Basin aquifer. The riverbank extraction wells, if operated, will undoubtedly draw Colorado River water through the organic layer into the extraction wells. The water rights and legal points of diversions for these extraction wells must be presented to the Tribes to prove that PG&E can lawfully pull water from the sacred Colorado River.	The scope of PG&E's existing water entitlements were described and assessed in Chapter 4.12 of the EIR that was certified by DTSC (and in the Draft EIR that was circulated for review and comment). This analysis included both the amount of water needed for the project and the points of diversion. The EIR concluded, "Any of these points of diversion are permitted" under PG&E's existing Lower Colorado Water Supply Project entitlements. The EIR evaluated water use during construction, during operation, and during decommissioning of the remedy, and in each instance, the EIR concluded that the existing entitlement was more than sufficient to serve the project needs. Given that this issue was fully disclosed and assessed in the EIR, the commenter is referred to that document.	Comment and response noted	Comment and response noted.		
137	Hualapai-25 and TRC-16			Water Rights for Fresh Water Wells Also, the current fresh water supply for the remedy is the single well, HNWR-1. There presently appears to be no alternative for water supply to the site. Are the existing TCS supply wells Topock-2 and Topock-3 intended to provide a contingency source for injection water to maintain a positive groundwater flow? **TRC Recommendation:** Discussion of fresh water supply alternative/contingency should be included in the 60% design report.	Currently, HNWR-1 is proposed as the primary well to supply the freshwater injection system for the groundwater remedy and the compressor station. To date, pumping conducted by the Refuge indicate that HNWR-1 is likely able to supply sufficient water for both purposes (planning is underway for additional pump test at this well). The current supply wells for the compressor station (Topock 2 and 3 wells) would remain connected as a back-up supply, although at present it is not certain that these wells would have sufficient capacity to supply the compressor station, the groundwater remedy, and the other customers of Southwest Water company. Additional discussion about freshwater contingency plans and the results of aquifer testing at both Topock 2 and 3 and HNWR-1 will be provided in the 60% design submittal.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of supplemental fresh water supply information and the 60% design submittal.		See draft O&M Manual, Volume 3 – Contingency Plan for freshwater contingency plans. The Topock-2/3 pump test results are summarized in a tech memo that is included as an attachment to the RTC table in Appendix J The pump tests are also discussed in Section 3.3 of this BOD Report.

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138	Hualapai-32			Further Considerations for 60% Design Evaluation Fresh-water from other sources and injected into the Site ideally would have water-quality characteristics similar to the aquifer geochemistry corresponding to different levels of the aquifer (shallow, middle, and deep). This means that for injections in the shallow part of the upland aquifer, TDS concentrations of injected water should to be on the order of 2,000 to 4,000 mg/L, for the middle level 4,000 to 6,000, and the for the deep aquifer TDS concentrations need to be 6,000 to 12,000 mg/L, depending on the location. The concern is that disparities in introduced water would result in density-driven fingering of injected waters that would be compounded with the geologic heterogeneities and result in a prolonged remediation time frame.	See response to comment HA-8a. The variation in density over the majority of the site is not considered significant enough to cause density-driven fingering. However, fingering due to aquifer heterogeneity is fairly common, and the monitoring program will be used to detect concentrations that deviate from model predictions due to fingering and other processes. Aquifer heterogeneities were modeled in the floodplain (where data are plentiful) during calibration with PEST. Additional heterogeneities that give rise to unexpected groundwater levels and/or concentrations will be identified by monitoring and incorporated into the model as necessary. The revisions to the model will assist in adjusting pumping or injection rates if necessary to minimize cleanup time.	Comment and response noted.	Comment and response noted.		
139	DOI-35	Section 3.3.1.1/ 3-15/ Last Paragraph		It is stated that the current design flow rate for freshwater injection is 600 gpm. This value does not align with the fresh water extraction flow rates (minimum, nominal, maximum) in Exhibit 3-4. Please explain.	The text will be revised to clarify that the current design and modeled flow rate for freshwater injection is 550 gpm. The freshwater supply extraction flow rates in Exhibit 3-4 included the freshwater usage of 110 gpm by TCS (see footnote a).		Okay	Comment resolved.	See Section 3.3 of this BOD Report.

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140	DTSC-54	Page 3-15, Quantity of Water Available	"During remedy implementation, several of the Freshwater Injection Wells will be installed in areas where no previous wells have been drilled and hydrogeologic conditions are unknown. If the aquifer is more transmissive than anticipated in these areas, additional freshwater would be needed to create the gradient necessary for remedy operation. On the other hand, if the aquifer is less than transmissive than anticipated, less water would be needed."	DTSC is concerned by the statement that drilling is occurring in areas where no wells have been drilled and hydrogeologic conditions are unknown. All the proposed "FW" wells are located at or in close vicinity to existing wells. Furthermore, groundwater modeling based on site (as well as regional) hydrogeology is controlling remedy design and selection. The cited text must be revised. DTSC does request that PG&E locate the old "resort" well on figures (this well had been noted in older PG&E documents) and indicate what information is available from this well as it is located in the same area as FW-INJ-1.	In the alluvial fan depositional environment of the Topock site, hydraulic properties can vary dramatically over a distance of several feet. The groundwater model grid cells are intentionally made large enough to be able to average this small scale variability, however at the scale of a well, (a foot or so in diameter), there is potential that hydraulic conditions considerably different from average may be encountered. Only one of the proposed FW wells (FW-INJ-2) is nearby a location where aquifer testing has been conducted to estimate hydraulic properties of the aquifer. PG&E is unaware of any aquifer test data or well logs for the former well at the former Rancho Colorado near FW-INJ-1, but will locate and provide all available information for that former well in the 60% design. It is unlikely that any information regarding the former Rancho Colorado well will significantly decrease the uncertainty regarding performance of proposed well FW-INJ-1. Near Well FW-INJ-4 the aquifer pinches out. Well XM-9, drilled in bat cave wash just south of this location, was dry. No aquifer tests have been conducted in this area. The nearest test was a step-drawdown test at TW-1, but this location is outside the influence of that test. There is no way to be certain that the FW wells will be able to achieve the design flows until those wells are installed and tested. PG&E believes the original text accurately captures the uncertainty inherent in predicting the performance of new wells in an alluvial fan environment.	Okay		Comment resolved.	
141	DOI-34	Section 3.3.1.1/ 3-16/4th Paragraph		The 900 gpm flow rate for HNWR-1 is less than the 1,310 gpm maximum flow requirement identified in Exhibit 3-4 for the freshwater supply line. Calculations should be provided to substantiate that there will be adequate yield from this well for the Topock remediation project during peak water demand. Also, flow demand for HNWR's continued use of this well for irrigation needs to be accounted for, and if there is no demand, then it should be documented.	According to information received from US Army Corp of Engineers, well HNWR-1 produced 900 gpm with a pumping water level at 80 feet below land surface during the initial testing. During the subsequent revegetation project, the HNWR-1 well was pumped at rates exceeding 1,000 gpm for periods of 12 hours or more. The well screen extends from a depth of about 92 to 157 feet. PG&E will coordinate with the Refuge on the HNWR's demand for this well and to evaluate the well capacity to meet this and other needs.	Okay.	Okay.	Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.

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142	DTSC-55	Page 3-16, Quantity of Water Available	"PM-01 was used for several years, but reportedly produced relatively poor quality water with a TDS concentration of 3,000 mg/L. Well PM-02 was tested at 430 gpm but there was no record of the drawdown so no estimate of specific capacity could be made. Both of these two wells had mineralized water. The water from PM-02 was so saline that it was considered unusable and the well was apparently never put into production (LeRoy Crandall & Associates, 1986)."	Park Moabi area: The document should determine where the best location for a well in California might be located. This may be based on geology as well as historical pumping. Pumping data from PG&E test wells (TW wells) as well as IM3 extractors, injectors, etc. should also be cited as they are representative of California conditions. Data from "PMM Supply" from the Background Study must be cited and evaluated. It is suggested that hydraulic data be collected from PM-01 and PM-02 due to higher yields. The section comments (see column to left) on the poor water quality of wells PM-1 and PM-2 even though it is not the appropriate section to be commenting on water quality. More importantly, poor water quality is not defined. The "poor" TDS quality of 3,000 mg/L (note that the 3,000 mg/L value cited appears to be an error as PG&E data indicates TDS ranged from 800 to 1,000 mg/L circa 2005 to 2006 in PM-1) cited may be quite satisfactory for injection during the remedy since the injection area TDS ranges from approximately 1,000 mg/L to 6,000 mg/L depending on depth. The document must discuss desired injection water quality in detail and indicate that IM-3 injection wells have always been injecting treated water with TDS around 4,000 m/L into the FW-INJ-2 locale. The discussion on "poor water quality" should be rewritten for the 60% design. PM-01 analytical data must be summarized and tabulated. See comments above and below regarding PM-01 as the data from this well is not being properly accounted for and summarized. Arizona Wells: All data from Topock 1 must be included in the report including the reason why it was abandoned and replaced with Topock 2 and 3. Other wells in Arizona should be evaluated (see comments above). The results of upcoming hydraulic testing on HNWR-1, Topock 2 and Topock 3 should be provided to DTSC asap and incorporated into this document. The quality of hydraulic testing on Topock 2 and 3 should be stated as it is noted that old pump data are cited to characterize well hydraulics. From the quantity perspective, this section must conclude that the river is obviously the most proven source of water supply in the area and scores above California and Arizona wells.	The PMM Supply well referred to in the Background Study Report is well PM-03. It was considered in the evaluation. This point will be clarified in the text. In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.

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143	DTSC-56	Page 3-18, Paragraph 2, Water Quality and Potential Need for Pre-Conditioning Prior to Injection	'As noted in Exhibit 3-1, one of the wells drilled at Moabi Regional Park (well PM-02) produced highly mineralized water and was never put into service. The other high-capacity well (PM-01) produced water with a TDS concentration around 3,000 mg/L. Based on the relatively high mineral content of the water, there is some doubt whether a well at Moabi Regional Park would produce water that is geochemically compatible with the injection wells and the aquifer at the Topock site."	The second paragraph discusses "the relatively high mineral content of the water" without discussing quantitative water quality needs for injection. The discussion is poor and misleading as IM-3 injection water of 4,000 mg/L is not discussed and has been operating successfully for over 5 years. The text should be stricken and a balanced evaluation conducted. See comments on "poor water quality" above. Exhibit 3-1 does not cite appropriate information for well PM-01. PG&E sampled this well as part of the background study (November 2009) six times from 2005 and 2006 for a large suite of analytes and identified it as well "PMM-Supply". How PG&E came to overlook this data is concerning as it has direct bearing on Park Moabi supply well evaluation. Exhibit one should be modified to indicate that the casing depth of PM-01/PMM-Supply is 180 feet and not 190 as reported as based on Table 2-1 of the 2009 background study report. The perforated interval should be revised to indicate a dual screen from 28-42' and from 65-180'. Unlike that stated in Exhibit 3-1, PM-01 data for chromium and arsenic are available. Cr(VI) measures about 9ug/L while arsenic is around 2 ug/L. All data should be accurately tabulated in Exhibit 3-1 or an equivalent table. Provide a detailed discussion regarding geochemical compatibility of imported water in the section. Discuss IM-3 injection water quality data in the section as well. Data from the 2009 background study report must be utilized. Figure 2-4 of that report displays a Piper diagram that indicates that the PMM-Supply is geochemically similar to the site as it plots near site wells P-2, MW-10, MW-11, MW-17, and MW-18. This is contrary to what is stated in this section. Piper diagrams must be utilized in the geochemical discussion in this and other appropriate sections. Data tables should be prepared listing all Park Moabi analytical data for water wells. Additional Park Moabi analytical data should be collected as the document indicates that the data base is not extensive (However, note comments referring to existing data from PMM-Supply). The trace metal data discussion in this paragraph must be rewritten as the PMM-Supply data (most extensive and comprehensive dataset for any well evaluated in the freshwater supply section) that was overlooked by PG&E indicates that the water is of high quality. Manganese, iron, and total suspended solids are very low or below low detection limits suggesting that pre-conditioning prior to injection would not be needed. Trace metals are also low including the constituents arsenic and Cr(VI) - see Exhibit 3-1 discussion above. Based on this information, the section	The PMM Supply well referred to in the Background Study Report is well PM-03. It was considered in the evaluation. This point will be clarified in the text. In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.

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				must conclude that the water quality of PPM-Supply well is superior (low minerals, low plugging/fouling potential, low trace metals, and geochemically compatible) to all other water wells.					
144	DTSC-57	Page 3-18, Paragraph 3, Water Quality and Potential Need for Pre-Conditioning Prior to Injection		As previously discussed with PG&E, additional HNWR-1 analytical data should be collected since, as stated in the document, that the well has only been sampled once. Any conclusions regarding the water quality of this well are therefore provisional. Sound decisions cannot be made without adequate data and data evaluation. Data tables should be prepared listing all HNWR-1, Topock 1, 2, & 3 analytical data. Analytical data for other Arizona water wells should also be tabulated.	In coordination with the Refuge, the HNWR-1 well was sampled on February 23 and March 14, 2012, and will be sampled again in April. Data will be incorporated into the forthcoming technical memorandum on freshwater sources evaluation.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.
145	DTSC-58	Page 3-18, Paragraph 4, Water Quality and Potential Need for Pre-Conditioning Prior to Injection		The section should discuss the following issues about hexavalent chromium. First, data regarding chromium should be appropriately summarized (e.g., well data should not be omitted - see PMM-Supply discussions above). The document should note that the HNWR-1 well exhibits a hexavalent chromium concentration about double PMM-Supply. DTSC desires that as low a hexavalent chromium concentration as possible be used for freshwater supply due to its toxic nature and since the uncontaminated aquifer area planned for freshwater injection exhibits very low to nondetect chromium concentrations at depth that increase upward in the aquifer profile (see Figures 2-3 a, b, and c of the document). Chromium added to the deeper portion of the aquifer could result in a potential increased risk/threat as a result of implementing the remedy. The section should acknowledge this concern and include it as criterion used to evaluate freshwater supply sources. The issue is not to simply pick a value below the regional background value of 32 ug/L. The section should conclude that the river would be the superior source of water with respect to hexavalent chromium concentrations as proven by the massive river data base that are typically nondetect for chromium (even excluding non-PG&E data bases).	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.
146	DTSC-59	Page 3-18, Paragraph 5, Water Quality and Potential Need for Pre-Conditioning Prior to Injection		The arsenic section must be rewritten. The section must acknowledge that the regional background arsenic UTL of 24.3 ug/L is inappropriate for the site as a screening criteria for freshwater injection (See DTSC comments on the Revised Groundwater Background Study dated February 29, 2008). The section should indicate that the average concentrations of arsenic in the vast majority of site monitoring wells are below the background UTL of 24.3 µ/L. The section should mention that Figure 2-7 of this document illustrates that arsenic concentrations are approximately 3 ug/L in all portions of the	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.

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				aquifer where freshwater injection is planned. The section should also cite the 2009 regional background report and include Figure 2-7 from that report which illustrates that the highest arsenic concentrations in the region, which are greater than MCLs, occur in the immediate vicinity of well HNWR-1. The section should further state that the background report suggests potential hydrothermal activity in Arizona is associated with the elevated arsenic. DTSC requests that areas outside the area of elevated arsenic and hydrothermal activity also be evaluated for freshwater supply. DTSC has concerns with importing and injecting water containing arsenic above the MCL and above site specific background concentrations on the California side of the river. In addition, DTSC is concerned with ARAR compliance such as meeting Basin Plan standards established by the Regional Water Quality Control Board. DTSC is reluctant and may not be allowed to authorize injection of imported water into the ground that exceeds MCLs and degrades the aquifer. DTSC desires that as low an arsenic concentration as possible be used for freshwater supply due to its toxic characteristic. Typical arsenic (and other analytes) concentrations of river water should be discussed and documented. The section should conclude that based on existing data, well HNWR-1 has the poorest water quality with respect to arsenic in the study area.					

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147	DTSC-60	Page 3-18, Paragraph 5, Water Quality and Potential Need for Pre-Conditioning Prior to Injection		Arsenic modeling simulations are discussed in this section and suggest that elevated arsenic above MCLs from well HNWR-1 would naturally adsorb to iron oxides in the aquifer matrix when injected into California waters leaving a minimal arsenic footprint. The section must comment on potential well fouling associated with HNWR-1 arsenic (and any other constituents) precipitation into the pores throats of the formation during injection as the section postulates that arsenic is removed in such a manner. The section must clarify how Arizona water that is argued to be geochemically similar in the preceding paragraphs, would then become dissimilar with respect to arsenic when injected in California. The section must indicate why dissolved arsenic is stable in aerobic waters withdrawn from well HNWR-1, but would become unstable when injected into aerobic waters in California. The section should also cite that it was not anticipated in prior documents, that freshwater supply injection would entail injecting water with detrimental constituents at concentrations above an MCL into aquifers containing concentrations less than MCLs.	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.
148	DTSC-61	Page 3-20, Paragraph 1		As stated earlier, there is speculative discussion regarding trace pollutants in the River. River data for the <u>specific area</u> must be cited to support assumptions and quantify any valid concerns. Have trace river pollutants been discovered at the Topock site area? Have these pollutants migrated into the aquifer due to IM-3 pumping or injection? The section must indicate what testing has already been conducted in the Topock area to ensure PG&E's concerns with trace river pollutants have not already adversely impacted the aquifer that we are trying to clean up? PG&E should evaluate its own data set as well as others for the Topock area (e.g., MWD). PG&E must also discuss and evaluate how pumping from freshwater supply wells could draw river water (polluted or not) across aquifers and towards pumping centers. This portion of the paragraph needs to be revised. The paragraph concludes that "water from the river or from a river infiltration gallery is not preferred based on the criteria of water quality." This statement cannot be made without river water data to support it. DTSC recalls that MWD's river data base for the area did not exhibit elevated trace metals and that testing did not detect perchlorate. It would therefore seem that the river would have superior water quality. See comments above on section 3.3.1 Freshwater Supply Sources (Page 3-14) related to freshwater filtration and conditioning. Based on existing information in the document, PG&E will need to	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.

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				make a good faith effort addressing design of a river water conveyance system and any needed conditioning. Conditioning systems already planned for the remedy should be discussed and summarized for comparative purposes. This will allow an educated assessment of the various freshwater sources.					
149	DTSC-62	Page 3-20, 1st paragraph	In addition, water pumped from an infiltration gallery would likely contain elevated concentrations of iron and manganese due to the geochemically reducing conditions present in the fluvial sediments surrounding and underlying the river.	PG&E has not provided fresh water selection criteria on what concentration would be acceptable for the remedy to discount the use of infiltration gallery. Furthermore, in reviewing the concentrations from the California slant wells, the manganese concentration ranged from 200 ppb to approximately 2.5 ppm where most of the higher concentrations are from MW53D. Iron data ranged from 100 ppb to 7 ppm where most of the ppm range data are from the shallow well 52S. Is it possible to design the infiltration gallery to target zones with lower concentrations of unwanted constituents?	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.
150	DTSC-63	Page 3-20, Paragraph 2, Disturbance Associated with Construction	"The river intake structure would likely represent the greatest level of disturbance both during and after construction of any of the three options. Much of the river intake construction disturbance could be mitigated if permission could be obtained to mount the river intake from the I-40 or the railroad bridge."	The section will need to be revised to explain and support the contention that the river intake structure would likely represent the greatest level of disturbance. It is not clear what criteria are being used to make this assessment. Is it volume of soil disturbed? Is it aesthetics? Is it time taken to construct? It is also not clear what PG&E is envisioning for the structure and what range of intake designs exists that would address the needs of the remedy. PG&E should attempt to consider an intake design with as minimal a disturbance as possible. The document should clarify why the freeway or railroad bridge are cited for mitigating disturbance. The section should also comment on why the other bridges to the south are not being considered. Also see comments above on section 3.3.1 Freshwater Supply Sources (Page 3-14) related to freshwater filtration and conditioning.	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.

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151	DTSC-64	Page 3-20, Paragraph 3, Disturbance Associated with Construction	"Based on a preliminary evaluation of the type and amount of construction for the three identified options, using the existing HNWR-1 well in Arizona is the preferred option. By using an existing well, which has already been proven to provide an adequate quantity and quality of water, additional well drilling would be avoided." "If wells at Moabi Regional Park were selected as the water source, it is likely that several wells would need to be drilled in order to find a sufficient quantity and quality of water."	This section needs to be rewritten pending additional data to be collected for both the PMM-Supply well and HNWR-1 well. In addition, PG&E should also include a better analysis and evaluation of the river intake option. It is premature to select the HNWR-1 well based on the evaluation presented in this document as it lacks specifics with respect to evaluation criteria as well as data to support selection. The section should indicate that the water quality of HNWR-1 has not been proven and that the one sample collected from it so far yields elevated arsenic and hexavalent chromium. The disturbance associated with it also seems significant (significant length of buried pipe and a bridge span). Please clarify how the quantity of water from HNWR-1 has been proven (How many times has it been hydraulically tested? For how long and what rate and drawdown? What is its normal pumping rate? How many hours has it pumped water?) The same questions apply to any well being considered. The section should comment that the PMM-Supply water quality appears satisfactory, if not superior, when compared to other wells. Clarify why several wells would need to be drilled at Park Moabi (clarify the desired pumping rate and water quality for the remedy). PMM-Supply yields superior water quality at relatively high yields. If it still didn't provide sufficient quantity, wouldn't one just install one well in a neighboring area? What happens if HNWR-1 cannot provide a sufficient quantity of water either short term or long term?	As mentioned in response to comment #144 DTSC-57, the HNWR-1 well was sampled, in coordination with the Refuge, on February 23, 2012, and will be sampled again in March and April. Data collected will be summarized in the forthcoming tech memo. As mentioned in responses to comments #142 DTSC-55 and #143 DTSC-56, PMM-Supply well (in the Background Study report) is also called PM-03. Well PM-03 has been sampled on an annual basis and was recently sampled in the December 2011 annual event. Data will be summarized in the forthcoming tech memo. In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.
152	DTSC-65	Page 3-20, Paragraph 4, Disturbance Associated with Construction		This paragraph needs to be rewritten pending additional data and analysis. See previous comments on water quality, disturbance, conditioning, and water compatibility.	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.
153	DTSC-66	Pages 3-20 and 3-21, Preferred Freshwater Supply Option to Carry into Design		This paragraph and Exhibit 3-3 need to be rewritten pending additional data and analysis. See previous comments on water quality, disturbance, conditioning, and water compatibility. Based on the limited evaluation presented in the document, DTSC favors the river intake structure with filtration.	In response to this comment, a technical memorandum will be prepared to present the evaluation of the three potential freshwater sources and PG&E's conclusion.	Okay pending review of TM		Comment resolved.	See Section 3.3 and Appendix J of this BOD Report.

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154	DOI-36	Section 3.3.2/3-22/ Exhibit 3-4		The minimum, nominal, and maximum freshwater extraction and injection flows do not balance. Is this to be interpreted that the injection flow rates relate to well design only? The nominal and maximum design flows for UPGRAD-INF-4 are the same value. Is this a mistake? Per footnote d, the pipeline capacity of 1,310 gpm is based on maximum flow to freshwater (600 gpm) and carbon amended injection wells (600 gpm) (plus TCS usage). The 600 gpm values cannot be gleaned from any information in Exhibit 3-4.	Exhibit 3-4 will be revised to clarify the following points: 1. The minimal, nominal, and maximum flow rates for the wells represent the design flow rates established for each of the individual wells. The total minimal, nominal, and maximum flow rates have been established through groundwater modeling scenarios throughout the remedy duration, and therefore the aggregate flow rates for the minimum and maximum do not balance. The minimum flow rate indicates that one or more injection wells are not used (for example FW-INJ-2). The maximum flow rate scenario indicates that the provisional well (FW-INJ-3) would be in operation. 2. The nominal and max flows of 200 gpm for UPGRAD-INJ-4 as summarized in Table 3-2 are correct. This flow rate was employed in the nominal and maximum scenarios. Under all scenarios, freshwater will be injected into UPGRAD-INJ-4. 3. The current design and modeled flow rate (shown in Appendix B) for freshwater injection is 550 gpm (200 gpm for UPGRAD-INJ-4, 100 gpm each for FW-INJ-1, FW-INJ-2, and UPGRAD-INJ-3, and 50 gpm for FW-INJ-4). In addition, the compressor station has a demand of 110 gpm. The nominal flow rate in Exhibit 3-4 will be revised to 660 gpm. 4. The conveyance pipe for freshwater from AZ will be sized to accommodate the max aggregate flowrate for the entire Outer Loop injection well network (including FW-INJ-4) of 600 gpm (see footnote d of Table 3-2), the max aggregate freshwater flow rate for the Inner Loop injection well network (e.g., UPGRAD-INJ-2, UPGRAD-INJ-3, and UPGRAD-INJ-4 are receiving freshwater at the maximum flow rate) of 600 gpm, and TCS usage (110 gpm). The maximum flow rate in Exhibit 3-4 will be revised to 1,310 gpm.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See Exhibit 3.3-4 of this BOD Report.
155	DOI-37	Exhibit 3-4		The exhibit indicates that a fourth fresh water injection well may be installed, if necessary. Please indicate on a figure possible locations for installation of the fourth fresh water injection well.	If it is not possible to inject a sufficient quantity of water in one of the three primary locations, a fourth injection well may be needed. It would likely be located somewhere near the location where additional injection capacity was needed. Possible locations for this well will be provided in the 60% design.		Okay pending review of 60% design submittal.	Comment resolved.	See Figure 3.0-1 of this BOD Report.

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156	DTSC-67	Page 3-23, Exhibit 3-4, and Page 3-24 1st Paragraph	Superscript of Pipeline capacity, 1310 gpm. "[d] This total includes the maximum flow to Carbon-amended Injection Wells (600 gpm) and Freshwater Injection Wells (600 gpm) plus the maximum for TCS usage (110 gpm)." Also, "to accommodate potential future operational changes associated with the remedy while maximizing the use of existing facilities, the design incorporates the current freshwater supply system for the Compressor Station."	According to PG&E during telephone discussion on February 8, 2012, PG&E is evaluating the fresh water supply infrastructure separately from current TCS usage except for common components such as water storage tank. PG&E stated that the water supply for TCS use will continue to be Topock 2 and 3 wells. However, the cited text suggests the contrary that the design parameters would include TCS operational usage of 110 pgm. See also Figure 3-10 flow diagram from Fresh Water Supply Well (HNWR-01). PG&E should clarify if operational uses at the TCS are accounted into the design. DTSC believes that tying Compressor Station needs into the remedy is outside the project scope and has not been accounted for in previous documents and potentially limits, unnecessarily, selection criteria that should be developed for selecting a freshwater source (e.g., total flow demand for the remedy is stated to be a nominal 250 gpm, but 360 gpm if Compressor Station needs are added to flow demands). There is no apparent need to potentially burden the groundwater remedy with the needs of an unrelated project. If there is desire by PG&E to share infrastructure (e.g., Compressor Station storage tanks), then the infrastructure should be operated or retrofitted to accommodate separate systems, if needed, or replaced by new infrastructure. Exhibit 3-4 should be revised to address these concerns.	The February 8, 2012 discussion was centered around the rationale for certain planned infrastructure (specifically the freshwater supply storage) associated with freshwater supply from Arizona. PG&E explained that for storage, the shared use of the existing TCS freshwater storage tanks (currently receives water from Topock 2/3 wells) minimizes the need for installation of a separate new tank and is consistent with the mitigation directives to use existing facilities where available. In addition, PG&E explained that since the existing tanks also receive Topock 2/3 water, this means that Topock 2/3 well water can serve as a backup to the HNWR well water, which could minimize the need for another well to be drilled in Arizona. This aspect will be verified in the 60% design submittal. Because of its relatively small volume, the Compressor Station water usage does not drive/impact the size/footprint of planned remedy infrastructure (e.g., the 12-inch freshwater pipeline from HNWR well to the existing TCS storage tanks). A new freshwater line is needed to convey water from AZ regardless, and the size of this line is not impacted by the 110 gpm TCS usage.	Okay.		Comment resolved.	

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157	DTSC-68	Page 3-24, Section 3.3.2 Design Basis for Freshwater Supply System	"To accommodate potential future operational changes associated with the remedy while maximizing the use of existing facilities, the design incorporates the current freshwater supply system for the Compressor Station. The Compressor Station's current water need (approximately 110 gpm) is served by Topock-2 and -3 supply wells in Arizona; the freshwater is conveyed via a pipe crossing the Colorado River on the arch bridge. Coordinating with the Compressor Station's water supply allows for the potential increase in freshwater demand by the remedy to be met with minimal additional infrastructure (see Section 3.3.2.2 for details)."	The document must clarify what is being stated. Are separate pipelines from Topock 2/3 and another freshwater source being proposed? It appears that water from Topock 2/3 is proposed to be mixed with the remedy freshwater in the storage tanks. If this is indeed the case, then the section on freshwater quality must acknowledge this blending of waters and highlight Topock 2/3 water quality. A comprehensive listing of all data from Topock 2/3 is necessary. As DTSC has concerns with elevated hexavalent chromium and arsenic that are also present in Topock 2/3, the mixing of Topock 2/3 water with the freshwater source may also be of concern.	The existing pipeline from Topock 2/3 will remain as is. There is a new pipeline conveying freshwater from the HNWR well proposed in the 30% design. The Topock 2/3 water quality will be presented in the forthcoming Freshwater Water Supply Source Evaluation Tech Memo (see response to comments #142 DTSC-55 and #144 DTSC-57)	Okay		Comment resolved.	See Appendix J of this BOD Report.
158	DTSC-69	Pages 3-24 to 3-25, Section 3.3.2.1 Freshwater Supply Piping Network	With the current preliminary design, the primary benefit of a looped system is having the operational redundancy and flexibility to minimize unplanned downtime over the decades-long life of the remedy. The energy savings associated with a looped system are small given the current design since most of the freshwater injection flow will not require pumping. This could change if the final design is different. As currently designed, the looped segment is less than 2,200 feet long or just over 10% of the total freshwater pipe length (21,200 linear feet).	The desired operational redundancy should be weighed closely against Tribal concerns as the redundant Bat Cave Wash loop is located adjacent to the Maze. The section should also comment on the long term repairs to the Bat Cave Wash segment knowing that periodic storm events can destroy infrastructure located in this particular wash. The reason postulated for the loop is that it would minimize remedy downtime. It is uncertain how big a concern downtime is at this point. A discussion of downtime should be presented that lists disadvantages and assesses if they are critical over the short and long term.	The draft O&M Manual will include a section that discusses pipeline maintenance. The draft O&M Manual is part of the 60% design submittal. In the 30% design, PG&E proposed a looped configuration in the piping, power, and control systems to provide more system reliability. A looped system offers redundancy in critical utility connections which are often difficult to access and repair. With a looped system, most final remedy wells could be served from either direction in the loop, allowing many of the wells to remain in operation while repairs were made to underground utilities. Other benefits of a looped system commonly include reduced energy usage due to lower pressure losses. For this project, the energy savings are small since the primary pumping is for well backwashing; this occurs infrequently and the injection lines are gravity fed so no energy is required.	DTSC will review the design as it becomes available.		Comment resolved.	See Figure 3.0-1 of this BOD Report. The Bat Cave Wash piping corridor has been eliminated; piping is routed through the NTH piping corridor and crosses Bat Cave Wash on two aerial crossings.

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				Could the looped system in Bat Cave Wash be replaced with a longer loop that would simply double back in existing trenches?	It is important to note that, in contrast to IM-3 which is designed to reverse the natural gradient in the floodplain, the Final Remedy is designed to enhance the natural groundwater gradients at the site. If the Final Remedy is shut down, the natural gradient will continue to move the chromium plume across the IRZ barrier, but at a slower rate. The NTH IRZ is designed to operate passively for long periods with no carbon substrate injection. Consequently, short periods of downtime will not have a significant effect on the ability of the remedy to meet RAOs. In contrast, relatively short periods of IM-3 downtime during times of low river level can result in a failure to meet the IM-3 goal of gradient control. Therefore the design of the Final Remedy can be more tolerant of failures that would result in short periods of downtime than was possible with IM-3. The remedy design should therefore focus on prevention of failures that could result in long periods of downtime, lasting several weeks or months which, over the life of the remedy, could add significantly to the overall cleanup time. The effects of downtime depend in large part on the location and nature of the failure. PG&E anticipates most failures of mechanical or electrical components can be repaired within a few days to weeks. There will be an appropriate level of spare parts and service capabilities to respond to component failures quickly. Failures of underground piping, power, or control links could take longer to repair due to the difficulty of access. The loop system was one way to provide redundancy in the utility links. Providing redundant piping and conduits in a common trench is another option for including redundancy. In response to DOI's and DTSC's direction (see comment #182), the 60% design submittal will include a modified design to eliminate the Bat Cave Wash segment. It is feasible to loop the system by doubling back in the piping corridors on National Trails Highway and on old route 66 without going through Bat Cave Wash. The main drawbacks are the increased pipe lengths and increased trench widths (e.g., additional pipe lengths of 17,000+ feet for freshwater, 17,000+ feet of electrical conduits, etc.). The drawback will be magnified under an aboveground piping scenario.				

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159	HA-21	p. 3-24, Section 3.3.2.1 (Freshwater Supply Piping Network)		The first paragraph indicates that of the total 21,700 feet of freshwater piping, approximately 25 percent, will be aboveground and 75 percent underground. What will determine this placement and is a map showing the aboveground vs. underground runs available? Please refer to Attachment B with regard to the Tribe's position on the placement of piping above vs. underground.	Figure 3-1 of the 30% BOD Report shows the aboveground vs. underground piping runs. This figure will be revised in the 60% design to reflect DOI's and DTSC's direction to modify the piping network to eliminate the piping/conduit segment in Bat Cave Wash. PG&E will evaluate the feasibility of additional locations for aboveground piping (in addition to locations already proposed in the 30% design) during the development of the 60% design. In general, the rationale for placing **electrical conduits** underground (versus aboveground) is as follows: <u>High voltage supply lines (from supply source to transformers)</u> – the National Electrical Safety Code (NESC or ANSI/IEEE C2-2007) is the American National Standard to which public or private US electric utility companies adhere to for design, installation, and maintenance of electrical supply lines. The NESC includes safety requirements for three types of utility construction: 1. Rules for Electric Supply Stations and Equipment (Substations) 2. Rules for Overhead Electric Supply and Communication Lines 3. Rules for Underground Electric Supply and Communication Lines Any design that does not conform to the requirements set out by the NESC is considered non-Code compliant. An above-ground, non-overhead, high voltage supply line is an example of non-Code compliant. <u>Low voltage distribution lines (after transformers to wells)</u> – Besides the risk of electrical injuries from contact, long runs of exposed electrical conduit also present additional design and O&M challenges because: 1. When the conduit is above ground and/or exposed to the sun, the wiring in conduit will be subject to extreme changes in temperature. This will cause the wire plastic or rubber covering to become brittle over time, and failures will be much more likely to occur. Repairs will be complex when the runs are long. Failures, depending on where they are, can take hours to days to isolate and weeks to repair. 2. Over long runs, the design will need to accommodate expansion and contraction of the conduit. The wiring does not expand and contract at the same rate as the conduit. This movement, can also lead to	Comment and response noted. DTSC notes that the certified FEIR included impact analysis for underground piping where possible based on information provided by PG&E on the conceptual design. Although DTSC recognizes the Tribes recommendation for siting pipelines and electrical transformers above ground, as discussed with the Tribes during the 3/20 meeting, other factors such as safety and regulatory constraints must be balanced with cultural resource considerations. DTSC agrees that the necessity of the pipeline network within the Bat Cave Wash be reevaluated.	Comment and response noted. The federal agencies have consulted with the Tribes on the 30% design with particular focus on this and related comments. The Tribes comments and the discussions which occurred during consultation meetings were considered in our direction to PG&E regarding modifications to the design including the implementation of the double-back loop along NTH, eliminating the BCW trenching. The federal agencies believe these design modifications take into account the impacts to the site and to some extent reduce the overall affects of the remedy on the cultural, religious, and spiritual values held by the Tribes for the TCP within the APE while recognizing our responsibility for protecting public safety, reducing ecological and visual impacts in the area. DOI, BLM, FWS and BOR are evaluating other options for above ground pipe runs, including in the areas adjacent to Old Route 66 and the Topock Compressor Station.		See Figure 3.0-1 of this BOD Report for piping alignment. PG&E further evaluated placement of piping in the utility corridor (underground or aboveground) during the 60% design development. Results of the evaluation are shown on Figure 3.0-1 of this BOD Report and the rationale is provided in Section C.2.2 of Appendix C (Design Criteria).

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					failure. 3. The wire and conduit will need to be larger if aboveground than underground, due to the temperature derating that will be required per code. In some cases, this will require two conduits where the underground design would require only one conduit. Basically, this will increase the infrastructure and footprint required for this installation. For **freshwater and remedy produced water piping**, the rationale for placing them underground (versus aboveground) is to not only avoid increased visual impacts, but also to protect the health, safety, and free movement of humans and animals. It will also protect the integrity of the remedy infrastructure, and minimize remedy footprint and future O&M challenges. There are a number of roadways with a heavy volume of vehicular traffic in the project area, including National Trails Highway in CA, Mohave County Road 10 in AZ, and the Compressor Station access road. Pipelines within the ROW of these roads was all placed underground in the 30% design. If motor vehicle accidents were to occur on these roads, they could cause serious injuries and significant damage to properties and remedy infrastructure (e.g., a car hits a pipe rack or a utility pole). More specifically, aboveground utilities do not have a breakaway component to dissipate the energy exerted from a vehicle crashing into them such as a light pole or a traffic cabinet with a breakaway base. The pipes will remain stationary and cause greater bodily harm to the occupants of a vehicle as well as create a service disruption. Exposed utilities would require a protective barrier of some sort, such as a concrete barrier or enhanced guard rail, which would further increase the footprint. In addition, elevated pipe racks (where vehicular traffic or health and safety preclude a near-ground level installation) would require a structural footing advanced below surface, possibly to a significant depth. Depending on the geotechnical characteristics of the soils, driven pile foundations may be necessary. Further, given the inherent vulnerability of aboveground piping (members of the public have been known to shoot pipes and large rocks or other debris may strike the pipe during a storm event, in addition, pipe will need periodically re-coated) there would be more maintenance of the piping required				

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					(compared to underground piping) and therefore more disturbance to nearby habitats as a result of maintenance activities, should piping be installed aboveground. An additional advantage to belowground pipe for the water system is the increased selection of piping materials available. Aboveground piping is limited to metallic materials (ferrous or non-ferrous) due to sunlight and piping durability. Metallic piping is susceptible to corrosion and requires lining and coating maintenance during the lifetime of the project. Belowground piping material, including fiberglass and HDPE, are far less susceptible to corrosion and are in many cases smoother, requiring smaller pipe sizes to transmit water. In the 30% design, the exceptions to underground piping are as follows: • For protection of the old Route 66 roadbed, a short section of pipe and conduits was designed aboveground in the upland area. This is consistent with the existing water injection line from IM3 to the East Mesa. However, it is PG&E's preference to install final remedy facilities in this location belowground, if it can be accomplished consistent with applicable cultural resources protection standards. PG&E is evaluating this and will propose underground facilities along this corridor, if appropriate. • The **freshwater pipe** crossing the Colorado River is placed aboveground on the Arched Bridge because placing this pipe under the Colorado River is more intrusive, complex, and is not necessary. • The **new freshwater pipe** from the Arched Bridge to the existing storage tanks will follow the alignment of the existing freshwater pipe. The reason that both water pipelines will be aboveground is because of their close proximity to PG&E's large, high-pressure gas pipeline.				
160	DOI-38	Section 3.3.2.2/ 3-25/2nd Paragraph		What is the TCS fire flow storage requirement and how is it factored into the design basis for the freshwater storage tank capacity?	The fire flow storage requirement is defined by the California Fire Code and administered by the San Bernardino County. The Code looks at the size and type of buildings and the building materials. More information, including storage requirements will be provided in the 60% design.		Okay pending review of 60% design submittal.	Comment resolved.	See Section 3.3.3.2 and Attachment E (Firewater System Hydraulic Analysis) of Appendix C (Design Criteria) of this BOD Report.

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161	DTSC-70	Page 3-25, Section 3.3.2.2 Freshwater Supply Storage		See comments above for section 3.3.2 Design Basis for Freshwater Supply System, Exhibit 3-4, Page 3-22, 23 and 24. Provide some clarification/details regarding the "fire flow storage requirement for the remedy."	See response to comment #160 DOI-38. It should be noted that the fire flow requirements apply to the Station as a whole including remedy buildings.	Okay pending review of 60% design submittal.		Comment resolved.	See Section 3.3.3.2 and Attachment E (Firewater System Hydraulic Analysis) of Appendix C (Design Criteria) of this BOD Report.
162	DTSC-71	Page 3-25, Section 3.3.2.3 Freshwater Injection Wells	"Injection wells will be constructed using up to 14-inch nominal diameter well casing with one or two discrete screened intervals."	The rationale for selecting one or two discrete screened intervals should be explained as should the anticipated location of the screen(s).	The depth and interval of the freshwater injection well screens will be determined in the field after the pilot borehole has been drilled at each respective location. The depth and length of the well screen(s) will be dependent upon the materials or lithology encountered during drilling to insure the well is built in the target aquifer. It is possible that a well may be built with two discrete screened intervals if a fine grained hydrogeologic unit separates two water bearing zones of significant thickness. Wells with two discrete screened intervals could provide flexibility during operation if it is determined injection into one unit versus another, is more effective at meeting the remedy goals. Also see response to comment #76 (DOI-24) (revise Table 3-1 through 3-4).	Okay pending review of 60% design submittal.		Comment resolved.	See Section 3.3.3.4 of this BOD Report.
163	DOI-39	Section 3.4/3-26/ Exhibit 3-5		There are 42 injection/IRZ wells if COMP-INJ-1 and 2 are included, and 40 if not. Exhibit 3-5 indicates 41. There are 13 non-IRZ extraction wells, not 14 as indicated in Exhibit 3-5. Footnote b – It is not clear how 6 months on and 18 months off equates to 30 backwashes per year. This is also not clear from Appendix F. Appendix F indicates that the IM-3 injection wells are backwashed 24 times per year, which is inferred to be a minimum number of backwashes required by the IRZ injection wells. Substrate is not injected into these wells so backwashing of the IRZ injection wells could be considerably more frequent. More discussion is required.	The well count of 41 injection/IRZ wells came from 32 IRZ wells + 4 upland injection wells + 2 TCS injection wells + 3 freshwater injection wells. The well count of 14 non-IRZ extraction wells came from 5 riverbank extraction wells + 8 Northeast of TCS/East Ravine extraction wells + 1 freshwater extraction well. The number of 30 backwashes per year came from the assumption that IRZ wells are backwashed weekly while they are in service, and are backwashed at a less frequent basis while they are not in service. The weekly backwash assumption was based on the Hinkley test at the IRZ well SA-RW-19, and not the IM3 injection wells.		Okay.	Comment resolved.	See Exhibit 3.4-1 of this BOD Report. As shown in the exhibit, there are 32 injection wells (24 IRZ + 4 IRL+ 2 TCS + 2 Freshwater), 4 IRZ extraction wells, 12 non-IRZ extraction wells (5 Riverbank, 5 East Ravine, 2 TW Bench), and 1 freshwater supply well.
164	DTSC-72	Section 3.4 Remedy-produced Water Management		Although this section described in some detail the remedy produced water management approach, the design of the system (e.g. the automatic backwashing system) does not seem to be reflected in the P&ID.	Comment noted. Additional information will be included in the 60% design submittal.	Okay, pending review of the 60% design submittal.		Comment resolved.	See Appendix D of this BOD Report (Engineering Drawings).

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165	HA-22	p. 3-26, Section 3.4 (Remedy-Produced Water Management)		This section indicates that approximately 7.3 million gallons of remedy-produced water (RPW) will be generated annually and provides a preliminary management plan. On p. 3-29, it is suggested that there may be a need for future changes in this plan. Is it likely that one of the future options will include the need for on-site treatment and therefore the construction of a new water treatment plant?	It is possible that in the future, there may be a need for on-site treatment. If and when that need is first recognized, it is anticipated that agencies/stakeholders will be engaged and Tribes will be consulted in accordance with applicable established communications and consultation requirements.	Comment and response noted.	Comment and response noted.		
166	DOI-40	Section 3.4.1/3-27/ 3rd Paragraph		What criteria are used to determine transport of rehab wastewater by pipeline or truck? A pH greater than 2 (not a characteristically corrosive hazardous waste) would be a criterion if remedy-produced water lines are not double lined. (Also see comment pertaining to page 3-13.) It is stated that once rehab water is determined to be suitable to convey in the wastewater lines, it will be pumped using portable pumps tied into the pipeline via tee connections. This implies rehab wastewater will be collected in a tanker truck. This would require secondary containment for the tanker truck at each well. Also, if the wastewater is suitable for conveyance in the pipelines, would it not be directly pumped in to the pipeline using the backwash or groundwater extraction pump? Please clarify.	The regulatory criteria for allowable transport of produced water (from well rehabilitation) by single –walled pipeline is pH>2, dissolved Cr<5 ppm, and dissolved As<5 ppm. At this time, PG&E does not intend to convey water that exhibits hazardous waste characteristics in produced water conveyance pipelines. In practice, well rehabilitation involves removing the existing infrastructure such as the extraction or backwash pump and downhole piping to enable insertion of rehabilitation equipment such as jets and swabbing devices. Therefore, normally present backwash pump would not be available for conveying produced rehabilitation water. First flush rehab water would, instead, be pumped out of the well with a temporary rehab pump through temporary piping, pH neutralized, and contained in temporary tanks located near the wellhead. All temporary tanks and piping will have adequate spill containment, as well as the area surrounding the wellhead.		Okay pending review of 60% design submittal.	Comment resolved.	
167	DOI-41	Section 3.4.2, Paragraph 1, Last Sentence		This statement is very misleading. Although the treated water would be used for a purpose, it will not be returned to the aquifer and could constitute a consumptive use.	The statement is meant to convey the concept that use of remedy wastewater in the cooling towers would preclude the need to pump an equivalent amount of groundwater for cooling water. Thus, the use of remedy wastewater in the cooling towers would not increase the consumptive use of water at the compressor station. This statement will be clarified in the 60% design submittal.		Okay pending review of the 60% design.	Comment resolved.	See Section 3.4.2 of this BOD Report.
168	DOI-42	Section 3.4.2/3-27/1st Paragraph		Indicate that a dedicated infiltration gallery in Bat Cave Wash is not being considered at this time because it is pending the findings of the soil RFI/RI and CMS/FS.	For clarification, the following text will be added to the 60% design submittal: "(note that an infiltration gallery in Bat Cave Wash is not being considered at this time because it is pending completion of the Soil RFI/RI and CMS/FS)"		Okay pending review of the 60% design.	Comment resolved.	See Section 3.4.2 of this BOD Report.

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169	DTSC-73	Page 3-28, Section 3.4.2 Reuse/Disposal Options and Conditioning, Exhibit 3-6		Exhibit 3-6, Item 2, “Other Constraints” which discusses using the evaporation ponds for discharge should mention that Regional Water Quality Control Board input is required as they regulate the ponds. It should also be noted that these evaporation ponds are outside of the EIR project boundary and additional environmental review may be necessary. The note at the bottom of the exhibit indicates that the Infiltration Gallery in Bat Cave Wash option is deferred until after completion of the Soil RFI/FS and CMS/FS. First, DTSC and a Tribe commented on the Gallery as it affected the soil work plan. PG&E indicated that the Gallery was no longer being considered, and therefore, soil comments related to the Gallery were dropped from further consideration. The note in this exhibit indicates that the soil comments should again be addressed. Notes on Figure 3-1 are different than the notes on Exhibit 3-6. These notes should be clarified and be made consistent throughout the document. PG&E needs to clearly indicate if it is permanently dropping its disposal option at the Bat Cave Wash gallery and Park Moabi sewage ponds from further consideration as part of the remedy design.	Comment noted. The following text will be added to Exhibit 3-6, Item 2, “Other Constraints” (similar to the text in Appendix F, Table F-5, page F-11): As mentioned in the response to DTSC comment #19 (Appendix F, page F-29), PG&E agrees that the TCS ponds are located outside of the EIR project area, but are still inside the Area of Potential Effects (APE). Sending water to the TCS ponds would be done by running a pipe to the existing cooling tower blowdown system. This new pipe would be located on the TCS property. So, no construction would occur outside of the approved project area. The footnote #5 in Figure 3-1 says “Potential infiltration gallery is pending completion of soil RFI/RI and CMS/FS. This footnote is not inconsistent with the footnote on Exhibit 3-6 which states that the infiltration gallery in Bat Cave Wash is not proposed in this submittal (i.e., included in the 30% design), pending completion of the Soil RFI/RI and CMS/FS. The infiltration gallery in Bat Cave Wash is being deferred/ retained and not dropped until after completion of the Soil RFI/RI and CMS/FS. Further evaluation of the Park Moabi sewage pond option will be performed at the 60% design stage, and the evaluation results will be included in the 60% design submittal. Also see response to comment #63 (DTSC-13)	Okay pending review of 60% design submittal.		Comment resolved.	See Section 3.4.2 of this BOD Report.
170	DOI-43	Section 3.4.2.1/3-29/ Exhibit 3-7		First note – please explain why chromium levels in backwash from freshwater injection wells would be high enough to warrant Option 1 or 4 management. Also, it appears you mean option 2 and not 4. With regard to first flush rehab water, the options for disposal are limited to TCS ponds or trucking offsite. This implies dissolved constituents are a major constraint for wastewater reuse (not simply low pH or high solids for which the treatment system has been designed to address). This requires further discussion.	The first note is an older note, a remnant of the drafting process and will be removed from the 60% design submittal. As discussed, the possibility of processing the first flush rehab water at the produced water conditioning plant will be evaluated in the 60% design.		Okay pending review of 60% design submittal.	Comment resolved.	See Section 3.4.2.1 of this BOD Report. Also see Appendix F of this BOD Report.

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171	DOI-44	Section 3.4.2.2		Backwash water from the IRZ injection wells will contain substrate. There should be discussion of possible biofouling of the filters and control measures.	Ethanol is soluble and will not foul the filters. The most potentially fouling water would be produced water from IRZ wells or carbon amended injection wells. As discussed in Appendix F of the 30% BOD, a pilot test has been underway at Hinkley since June 2011 to evaluate backwash frequency and backwash water quality at the IRZ well SA-RW-19. Noted observations from the Hinkley pilot test included: 1) frequent backwashing appears to reduce the buildup of solids (resulting from biomass buildup) and organic carbon in the tested well and 2) the biomass settles quickly in the settling tanks. The Hinkley test is ongoing and the data will be incorporated into the 60% design. In addition, coagulants/flocculants will also be evaluated during the 60% design (see page 3-33 of the 30% BOD) for potential benefits in improving settling of suspended solids in produced water. If the use of these agents is determined to be beneficial, this would require the installation of chemical storage tanks, chemical feed or metering pumps, and controls.		Okay pending review of the 60% design.	Comment resolved.	See Section 3.4.2.2 of this BOD Report.
172	DOI-45	Section 3.4.2.2/3-30/ 1st Paragraph		It is stated that "in the event that the produced water is hazardous, permitted transportable treatment units could be used." Is pH the only criterion for evaluating whether the rehab wastewater is hazardous? Would the permitted treatment units be owned by PG&E to facilitate immediate use, or would the service be subcontracted to a vendor?	The criteria for evaluating whether produced water from rehabilitation is hazardous are 1) pH for corrosivity and 2) dissolved chromium and arsenic for toxicity. There has not been a decision regarding ownership of permitted treatment units or outsourcing of treatment services for this site.		Okay.	Comment resolved.	
173	DOI-46	Section 3.4.2.2/3-30/ 1st bullet		It is stated that "remedy-produced water that has significantly higher concentrations than what exists in the aquifer…" Do you mean higher concentrations of dissolved solids? Please elaborate.	The statement refers to significantly higher concentrations of solids or dissolved constituents (e.g., byproducts) in remedy produced water than in what exists in the aquifer.		Okay.	Comment resolved.	
174	DOI-47	Section 3.4.2.2/3-30/ 1st and 2nd bullet		As indicated in the comment on Section 3.4.1, it is implied that first flush rehab wastewater will be collected in a tanker truck. There is also the possibility of using permitted transportable treatment units (see first comment on Section 3.4.2.2) or using the conditioning plant. Then there is the option to use the wastewater conveyance lines, or truck the wastewater to the conditioning plant, and finally the option to dispose of the wastewater off-site or at the TCS evaporation ponds with or without treatment. Although this will certainly need to be fleshed out in the O&M plan, there needs to be more discussion in 30% design on how this will work in practice with such a complex decision tree.	See response to comment #6 DOI-6.	Okay pending review of the 60% design.	Okay pending review of future documents.	Comment resolved.	See draft O&M Manual, Volume 1 – Operations and Maintenance Plan.

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175	DOI-48	Section 3.4.2.2/3-30/last paragraph on the page		How will temporary fluctuations in water quality result in achieving background water quality? This sentence should be reworded for clarification.	The subject sentence carried forward an important point made in the 2009 CMS/FS, Section 3 (Remedial Action Objectives), and that is in order to attain the RAOs for Cr(VI), substantial movement of groundwater in the target remediation area – either through natural or induced measures - will be necessary, and under active treatment for Cr(VI), it is expected that significant mixing of groundwater in the target remediation area would occur both vertically and horizontally, As a result, water quality and concentrations measured at individual monitoring wells are expected to change during the course of the remediation from concentrations present today. For clarification the second sentence of the paragraph will be revised to read: “Temporary fluctuations in water quality will occur during remedy implementation prior to achieving RAOs. Institutional controls will prevent…”	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See Section 3.4.2.2 and Appendix F of this BOD Report.
176	DOI-49	Section 3.4.2.2/3-32/third bullet from the bottom		It should be made clear that the discussion refers to first flush rehab water only. It should also be indicated that this water will be conditioned as required. There should be mention of secondary containment. A truck loading station in the Maintenance Shop seems odd and should be discussed further.	This text will be clarified in the 60% designed to be unconditioned produced water. Having a truck loading station in Maintenance Shops Area of TCS will give flexibility to handle this water. Specifically, given the proximity of the COMP-INJ-1/-2 and FW-INJ-4 wells, it would not be difficult to pump to the Influent Tanks at the Remedy Produced Water Conditioning Plant. As mentioned in Section C.4.5 (Secondary Containment) of Appendix C (Design Criteria), secondary containment will be sized and designed in conformance with applicable codes and standards. This will be reflected in the 60% design.	Okay pending review of the 60% design.	Okay pending review of the 60% design.	Comment resolved.	See Section 3.4.2.2 of this BOD Report
177	DOI-50	Section 3.4.2.2/3-32/second bullet from the bottom		It is not indicated that produced water conveyance piping will be double walled. If they are not double walled, then the lines cannot be used to convey characteristically corrosive hazardous waste (pH<2). Please discuss.	As indicated in Section C.4.1 (Piping) of Appendix C (Design Criteria), piping materials will be compatible with the characteristic of the conveying fluids and will be single walled unless the pipe is used to convey: 1) groundwater or remedy-produced water that exhibits hazardous waste characteristics or 2) concentrated carbon substrate. In these cases, double-walled piping will be used. At this time, PG&E does not intend to convey water that exhibits hazardous waste characteristics in produced water conveyance pipelines.	Comment and response noted. However, DTSC, in general, prefers the use of double wall piping for untreated waste water. DTSC will consider PG&E’s proposal after review of the leak detection system evaluation in the 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See Appendices C (Design Criteria) and D (Engineering Drawings)

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178	DTSC-74	3.4.2.2 Conditioning	"Under the management plan presented above, removal of dissolved constituents will not be required because the injected water quality will be similar to the aquifer water quality in/near the Carbon-amended Injection Wells, the IRZ wells, and the Freshwater Injection Wells. Temporary fluctuations in water quality that may occur within the remedy footprint during remedy implementation will ultimately result in achieving background water quality for hexavalent chromium when the remedy is complete, and institutional controls will prevent use of affected groundwater while the remedy is being implemented. Furthermore, contaminant migration to the river that could potentially affect water quality goals or beneficial uses does not occur during remedy implementation through groundwater extraction along the river bank. PG&E believes that this interpretation is consistent with the requirements of the anti-degradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution No. 68-16."	Metrics to ensure that "injected water quality will be similar to the aquifer water quality" will need to be developed by PG&E and obtain agency approval. As noted by comments on hexavalent chromium and arsenic related to the freshwater source, DTSC desires that the waters outside the current contaminant plume boundary not be degraded beyond site specific background conditions.	Comment noted. Additional information will be included in the Freshwater Supply TM.	Okay pending review of the Freshwater Supply TM.		Comment resolved.	See Section 3.4.2.2 and Appendix J of this BOD Report.

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179	DTSC-75	3.5 Other Utilities and Supporting Facilities		A soil management plan related to building and soil disturbance must be provided with the design. DTSC notes that PG&E is scheduled to submit the draft Operation and Maintenance plan with the 60% design. Therefore, the soil management plan and sampling and analysis plan should be included. Please note that PG&E should consider the following four objectives as part of those plans: 1) developing current conditions/background for comparison in the future during the eventual decommissioning of the unit –this cannot be deferred; 2) characterizing, for proper soil management, potentially contaminated soils in areas known or suspected to be contaminated (at AOCs or SMWUs); 3) assessing soils in areas without a known history of contaminant releases; and 4) geotechnical data to support the design.	A soil management plan will be prepared and submitted with the draft O&M Manual.	Okay pending review of the O&M plan and the sampling and analysis plan		Comment resolved.	See draft O&M Manual Volume 4 – Soil Management Plan.
180	HA-23	p. 3-34, Section 3.5.3 (Buildings and Structures for Major Equipment)		Please refer to earlier comments (See Comment No. 10) regarding cautions regarding the use and acceptability of previously disturbed areas.	See response to comment HA-9.	Comment and response noted	Comment and response noted.		See Section 3.5.3 of this BOD Report.
181	HA-24	p. 3-35, Section 3.5.4 (Access Roads and Pathways)		The discussion in this section pertaining to the use of on-site materials requires further discussion with the Tribe. In particular, it appears there may be relevance to the ongoing discussions regarding disturbed soils handling policy.	Comment noted. Ongoing discussions about displaced soils handling policy between PG&E, agencies, and Tribes will be reflected, as appropriate, in the 60% design submittal.	Comment noted.	Comment noted		See Section 3.55 of this BOD Report. Also see draft O&M Manual, Volume 4 – Soil Management Plan.

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Alternatives for Siting Infrastructure/Infrastructure Considerations									
182	HA-33			On January 9, 2012, members and representatives of the Fort Mojave Indian Tribe ("the Tribe" or "FMIT") and the Hualapai Tribe participated in a briefing and site walk of the project area led by representatives of PG&E. The purpose of the site walk was to examine the locations of various infrastructure components of the Topock Final Groundwater Remedy in the field. This included proposed pipeline routings, well locations, chemical storage tanks, electrical transformers, etc. In addition to the proposed facility locations presented in the 30% BOD, possible alternative locations were examined and the logistics of changing to these locations were discussed. This site walk was particularly useful and afforded the participants to carry information back to the Tribes for consideration. Subsequently, on January 20, 2012, a meeting and teleconference was held with members of the FMIT Tribal Community as well as representatives of the Hualapai Tribe, Colorado River Indian Tribes (CRIT), and Cocopah Tribe in addition to certain members of the TRC. The following is a summary of the FMIT's comments and conclusions with regard to the particular alternatives presented for infrastructure siting. <u>General Statement</u> The proposed pipeline corridors and groundwater wells are located in and adjacent to areas that are sacred to Native American Tribes. The mere entrance to these areas for purposes other than Tribal activities is itself a desecration of the site and the placement, use and maintenance of project structures (pipeline corridors and groundwater wells) is even a greater desecration. All of these desecrations are unacceptable to the Tribes. However, the following comments reflect our best attempt to address the adverse effects associated with the 30% BOD with the hope that the desecration that is ongoing will be minimized to some degree by our recommendations on how to treat the land. For several of the facilities, including transformers and pipeline routings, it was suggested by PG&E that construction could be either above or underground. In general, the consensus of the Tribal Community was that, whenever possible and despite the undesirable visual impact of such structures, an above-ground configuration would be preferable on the rationale that it would involve less intrusion into the sacred grounds both during construction and eventual decommissioning and dismantling. This is further discussed below. A figure is attached to depict the preferences of the	Comments are noted. As directed by DOI and DTSC, PG&E will modify the piping network to eliminate the piping/ conduit segment in Bat Cave Wash. PG&E will evaluate the feasibility of additional locations for aboveground piping (in addition to locations already proposed in the 30% design) during the development of the 60% design. It should be noted that (in addition to increased visual impacts) a more-extensive above ground pipeline configuration will pose many challenges including health and safety, engineering design, and long term operation and maintenance challenges. Thermal design considerations may require substantial additional footprint to allow for expansion/contraction loops as well as a potentially large support structures (e.g., pipe rack, conduits or cable tray, shade assembly). Further it is likely that significant lengths of pipe racks will need to be elevated to allow the passing of vehicular traffic, adding to visual impacts. Detailed rationale for aboveground vs. underground piping/electrical conduits are also provided in response to comment #159 HA-21. Also see response to comment #183 HA-34 on electrical transformers.	Comment and response noted. DTSC notes that the certified FEIR included impact analysis for underground piping where possible based on information provided by PG&E on the conceptual design. Although DTSC recognizes the Tribes recommendation for siting pipelines and electrical transformers above ground, as discussed with the Tribes during the 3/20/12 meeting, other factors such as safety and regulatory constraints must be balanced with cultural resource considerations. In response to comments received from the Fort Mojave Indian Tribe and Hualapai Indian Tribe DTSC has directed PG&E to modify the design to eliminate the piping/conduit segment in Bat Cave Wash and to replace this with the double-back loop along NTH.	The federal agencies have consulted with the Tribes on the 30% design with particular focus on this and related comments. The Tribes comments and the discussions which occurred during consultation meetings were considered in our direction to PG&E regarding modifications to the design including the implementation of the double-back loop along NTH, eliminating the BCW trenching, an area that is in close proximity to the Topock Maze. The federal agencies believe these design modifications take into account the impacts to the site and to some extent reduce the overall affects of the remedy on the cultural, religious, and spiritual values held by the Tribes for the TCP within the APE while recognizing our responsibility for protecting public safety and reducing ecological and visual impacts in the area.		See Figure 3.0-1 of this BOD Report for piping alignment. PG&E further evaluated placement of piping in the utility corridor (underground or aboveground) during the 60% design development. Results of the evaluation are shown on Figure 3.0-1 of this BOD Report and the rationale is provided in Section C.2.2 of Appendix C (Design Criteria).

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				Tribe as presented during the site walk.					
183	HA-34			Electrical Transformers The Tribe was told during the January 9, 2012, site walk that there are seven step-up transformers proposed in order to provide power along the pipeline route to sever the wells and other loads (p. 3-33, Section 3.5.1). PG&E stated it has the option of either installing these transformers in underground vaults or above ground. Since all the remedy's electrical components were not disclosed in the EIR, additional mitigation for impacts to cultural resources and aesthetics may be necessary with either option, The Tribe has considered these options and recommends the following: 1. The design of the electrical system may be overly conservative to require this number of transformers. PG&E should review the electrical component design to determine if the number of transformers can be reduced. 2. In consideration of the invasive activities that would be required to install transformers underground and then to dismantle them at the end of the project, the Tribe recommends that all transformers be constructed above ground even though there may be visual impacts. 3. The Tribe concurs with the siting of the transformer adjacent to the IM3 WTP to the alternative location next to Bat Cave Wash.	PG&E will continue to evaluate and optimize the design of the electrical system, including the precise locations of the transformers, and additional information will be presented in the 60% design. PG&E will consider these comments in formulating the 60% design. Also refer to response to comment #159 HA-21 for rationale for aboveground vs. belowground. In general, PG&E placed transformers belowground due to health and safety concerns similar to piping. However, wherever possible, transformers can be co-located (aboveground) with planned aboveground buildings, e.g., the MW-20 bench. The aboveground building acts as a barrier and provides protection from traffic. With respect to the design of the system, page 3-19 of the Final EIR states generally that the electrical connections will be placed in underground vaults wherever feasible. Counsel for the Tribe has confirmed in discussions with counsel for PG&E that the references to consideration of mitigation measures refers to measures from the EIR, and not additional measures.	Comment and response noted pending review of 60% design	Comment and response noted pending review of 60% design.		The number of transformers was reduced from 7 to 6 after further evaluation. A future provisional transformer was also identified in the event the future provisional well IRL-7 needs to be installed and operated. Their locations are shown in Figure 3.0-1 of this BOD Report.
184	HA-35			Pipeline Routings A number of pipelines are included in the design for the purposes of routing freshwater from the supply well in Arizona (HNWR-1) across the Colorado River to the upland freshwater injection wells and from the floodplain extraction wells adjacent to the western bank of the Colorado River to the upgradient injection wells as part of the inner recirculation loop. Consistent with the recommendation presented earlier with regard to running these pipelines above vs. underground, the Tribe recommends that, wherever possible, the routings should be above ground. In particular, 1. This includes pipelines associated with FW-INJ-4; MID-EX-1,-2,-3, and -4; UPGRADINJ-1,-2-3, and -4. 2. FW-INJ-4 piping would cross Bat Cave Wash, but the Tribe would still prefer that the piping be positioned above ground. 3. The proposed routing of the freshwater pipeline across the Colorado River to the Compressor Station should stay along former Route 66 rather than moving uphill to the El Paso gas pipeline right of way (ROW).	As directed by DOI and DTSC, PG&E will modify the piping network to eliminate the piping/conduit segment in Bat Cave Wash. The details of the pipeline configuration associated with UPGRAD-INJ wells, MID-EX wells and FW-INJ-4 will be dealt with in more detail during the 60% design phase. However, it must be noted that above ground piping will involve many potential challenges such as health and safety, long term operation and maintenance and engineering design issues. Detailed rationale for aboveground vs. belowground is presented in the response to comment #159 HA-21. The comment regarding routing freshwater pipeline crossing the Colorado River along the former Route 66 will be taken into consideration for evaluation during the 60% design.	Comment and response noted. DTSC notes that the certified FEIR included impact analysis for underground piping where possible based on information provided by PG&E on the conceptual design. Although DTSC recognizes the Tribes recommendation for siting pipelines and electrical transformers above ground, as discussed with the Tribes during the 3/20 meeting, other factors such as safety and regulatory constraints must be balanced with cultural resource considerations. In response to comments received from the Fort Mojave Indian Tribe and Hualapai Indian Tribe DTSC has directed PG&E to modify the design to eliminate the piping/conduit segment in Bat Cave Wash	The federal agencies have consulted with the Tribes on the 30% design with particular focus on this and related comments. The Tribes comments and the discussions which occurred during consultation meetings were considered in our direction to PG&E regarding modifications to the design including the implementation of the double-back loop along NTH, eliminating the BCW trenching. The federal agencies believe these design modifications take into account the impacts to the site and to some extent reduce the overall affects of the remedy on the cultural, religious, and spiritual values held by the Tribes for the TCP within the APE while recognizing our responsibility for protecting public safety, reducing ecological and visual impacts in the area.		PG&E further evaluated placement of piping in the utility corridor (underground or aboveground) during the 60% design development. Results of the evaluation are shown on Figure 3.0-1 of this BOD Report and the rationale is provided in Section C.2.2 of Appendix C (Design Criteria).BOD Report.

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						and to replace this with the double-back loop along NTH.			
185	HA-36			Alternate Injection Well Siting The Tribe considered the alternative locations discussed for the various injection wells associated with the inner recirculation loop. The following are the consensus recommendations. 1. FW-INJ-2 should be placed within the former Route 66/National Trails Highway (NTH) ROW instead of the currently proposed location. It is understood that this placement would require vaulting and that the NTH is a historic landmark. However, a utility vault in a “public highway” is not inconsistent with typical highway purposes, whereas it would be a less impactful desecration than placing it on unpaved Tribal sacred grounds. 2. UPGRAD-INJ-2 and UPGRAD-INJ-3 also are not sited in acceptable locations. As with FW-INJ-2, both should be moved onto the former NTH ROW and installed in vaults. 3. UPGRAD-INJ-4 also is not sited in an acceptable location. The preferred location would be within the median of I-40. However, PG&E stated that siting in the median was denied by Caltrans on the grounds of future plans to widen the I-40 to six lanes. This point needs independent verification and a consultation between Caltrans and the Tribes may be in order for Caltrans to reconsider its options. Therefore, the Tribe requests that an effort to re-approach Caltrans be made by the Agencies in coordination with the Tribes, explaining the conflicts with alternate locations. In particular, the timing of the proposed widening should be considered and evaluated in terms of the temporary use of this area as an injection well site. Assuming that plans for highway widening are sufficiently distant in the future, perhaps the site could be used in the interim and the well abandoned in favor of an alternate location when the road widening project begins. 4. Assuming that Caltrans remains unwilling to grant access for siting UPGRAD-INJ-4 in the I-40 median, the Tribe would prefer its placement within the drainage bottom east of the presently proposed location, as indicated on the attached figure, as opposed to the presently proposed site. **Additional comments/notes from Attachment B Map:** • Do not use this access road for UPGRAD-INJ-2. • Keep FW-INJ-2 in this area, closer to access road. • Remove IM-3 improvement from this area	As discussed at the 3/20/12 meeting with agencies and Tribes, PG&E will modify well locations as follows (in the 60% design) : 1. Relocate FW-INJ-2 as suggested in the Attachment B map of the FMIT’s comment letter. This well will placed in an underground vault. 2. Relocate UPGRAD-INJ-3 to a location closer to the old Route 66. To avoid the So Cal gas pipeline, PG&E propose this well be located on the north side of old Route 66. This well will placed in an underground vault. Relocate UPGRAD-INJ-2 as suggested in the Attachment B map of the FMIT’s comment letter. This well will placed in an underground vault. A new access road connecting to the old Route 66 will be designed in the 60% design for accessing this well. 3. As previously stated, PG&E met with Caltrans early in the design process to discuss the siting of an injection well in the median of I-40. PG&E was informed that siting of a well in the median of I-40 is not acceptable because of a) the median could be used in the future plans for widening of I-40 and b) the health and safety hazard associated with installing and maintenance of a well in the median. 4. Relocate UPGRAD-INJ-4 to the wash located just west of the proposed well location in the 30% design. An access road off the old Route 66 will be designed in the 60% design for accessing this well. PG&E proposes that the pipelines and conduits connected to this well will be installed underground in the roadbed of the newly-constructed road. Since this well will be located in a wash, PG&E proposed to place the well inside a semi-underground vault for easy access and to avoid water from inundating the vault in case of a flow event.	Comment and response noted. DTSC concurs with the modified well locations as proposed.	The federal agencies have consulted with the Tribes on the 30% design with particular focus on this and related comments. The Tribes comments and the discussions which occurred during consultation meetings were considered with respect to the modifications to the design concerning well locations in the upland area as indicated in the response.		See Figure 3.5-9 of this BOD Report.

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				and restore. • Is the location of UPGRAD-INJ-1 in future Tribal land? • Move UPGRADINJ- 3 to this location. • Move UPGRADINJ- 2 south and grade access road to Route 66. • Ridges in this area not acceptable for wells. • Move UPGRADINJ- 4 to this location.					
186	HA-37			TOC Amendment Storage Tank The Tribe reviewed alternative sites for construction of a 2,500 gallon storage tank for supplying the total organic carbon (TOC) amendment (ethanol) for *in situ* treatment at the "Transwestern Pipeline bench." The Tribe prefers the location along the Compressor Station entrance road, as opposed to the hillside, based on the expectation of less intrusion. **Additional comments/notes from Attachment B Map:** Recommended location for Alcohol tank.	Comment noted. These alternative locations will be reviewed in detail as part of the 60% design.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		After further evaluation, PG&E located the 3000-gallon carbon storage tank against the hillside to maximize the amount of available space for shared use of the Transwestern Bench space by the Topock remediation project and Transwestern gas operations.
187	HA-38			Impacts to Tribal Land As a general principle, the Tribe's preference is for as little remediation infrastructure to be placed on its property as possible. The Tribe and PG&E should consider this in implementing necessary access to the area.	The Tribe's preference is recognized and will be further considered during the development of the 60% design, consistent with the 2006 Easement Agreement and the 2006 Settlement Agreement between the Fort Mojave Indian Tribe and PG&E. A statement to this effect will be included in the 60% design submittal.	Comment and response noted.	Comment and response noted.		After further evaluation and consideration of Tribe's preference, PG&E relocated freshwater injection well FW-1 to outside the FMIT property line. See Figure 2.4-1, FW-1 is the western most well that is located just south of the FMIT property.
188	Hualapai-26			Selection of Remediation Well Locations *UPGRAD-INJ-1*: The pipeline that connects the UPGRAD-INJ-1 well should be above ground as indicated above, as this is the less-intrusive option. The well structure should also be above ground. There are no recommendations for re-locating this well.	As directed by DOI, UPGRAD-INJ-1 will be placed in belowground vault. Please refer to comment #159 HA-21 and #182 HA-33 for considerations regarding above vs. underground piping. For protection of the old Route 66 roadbed, a short section of pipe and conduits was designated as aboveground in the upland area in the 30% design. This is consistent with the existing water injection line from IM3 to the East Mesa. However, it is PG&E's preference to install final remedy facilities in this location belowground, if it can be accomplished consistent with applicable cultural resources protection standards. PG&E is evaluating this and will propose underground facilities along this corridor, if appropriate.	Comment and response noted.	Comment and response noted pending review of 60% design. During consultation meetings with the federal agencies, the tribes expressed their interest to have upland well structures below ground. The design will reflect this preference.		After further evaluation, PG&E proposed underground pipe trench along this segment of Route 66. See rationale in Section C.2.2 of Appendix C (Design Criteria).

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189	Hualapai-27			Selection of Remediation Well Locations *UPGRAD-INJ-2 and 3*: Well completions should be above ground as should connecting pipelines. Locations of these two wells however, are unacceptable. We concur with the Fort Mojave Indian Tribe to re-locate both UPGRAD-INJ 2 and 3 to the former Route66/National Trails Highway right-of-way as this is less intrusive and does not require the construction of a new road, creating further desecration to the area.	As directed by DOI, these wells will be relocated and placed in belowground vaults. Also see response to comment #159 HA-21 and #185 HA-36,	Comment and response noted.	Comment and response noted pending review of 60% design. During consultation meetings with the federal agencies, the tribes expressed their interest to have upland well structures below ground and move *UPGRAD-INJ-2 and 3*. The design will reflect the results of those discussions.		See Figure 3.0-1 of this BOD Report.
190	Hualapai-28			Selection of Remediation Well Locations *UPGRAD-INJ-4*: It is understood that the current locations proposed for remediation wells and infrastructure was initially placed with an attempt to consider both efficacy of the system, and minimizing surface disturbance. However, the current location of injection well UPGRAD-INJ-4 is troubling for two reasons. First, the physical location for this well is very near remnants of the Topock Maze which are still present in this generally disturbed area. Any additional traffic and disturbance in this area, especially over the decades-long time frame of the remediation would very likely result in further degradation of these remaining portions of the maze. In addition, the elevation of this well site is very close to that of the central portion of the maze located south, on the other side of I-40. Therefore, this well location is extremely visible and disruptive when viewed from the maze. We concur with the Fort Mojave Indian Tribe to re-locate UPGRAD-INJ-4 into the drainage east of the proposed location. This location is the preferred choice as it is at best, minimizing adverse effect to the ridge-line above and reduces visibility of well activities in an area that is sacred.	As directed by DOI and as discussed in the 3/20/12 meeting with agencies and Tribes, this well will be relocated to the wash located just west of the proposed well location in the 30% design. An access road off the old Route 66 will be designed in the 60% design for accessing this well. The pipelines and conduits connected to this well will be installed underground in the roadbed of the newly- constructed road. Also see response to comment #185 HA-36. Since this well will be located in a wash, PG&E proposes that it be placed inside a semi-underground vault for easy access and to avoid water from inundating the vault in case of a flow event.	Comment and response noted.	Comment and response noted pending review of 60% design. During consultation meetings with the federal agencies, the tribes expressed their interest to have upland well structures below ground and move UPGRAD-INJ-4. The design will reflect the results of those discussions.		See Figure 3.0-1 of this BOD Report.
191	Hualapai-29			Selection of Remediation Well Locations *FW-INJ-1*: It is understood that FW-INJ-1 is located to the north on the floodplain west of the access road (Route66/National Trails Highway). If this well fails, or is subject to salinity, where will an alternate injection well be placed?	Salinity would not preclude successful completion of an injection well, however, if low permeability aquifer materials were encountered in this area that limited the amount of water that could be injected, additional injection wells could potentially be drilled nearby in hopes of finding better aquifer materials, or an additional injection well could be installed at an acceptable location somewhere between FW-INJ-1 and FW-INJ-2.	Comment and response noted.	Comment and response noted.		Upon further evaluation, PG&E removed the FW-INJ-1 well previously located to the north on the floodplain west of the access road.

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192	Hualapai-30			Selection of Remediation Well Locations *FW-INJ-2*: Well completions should be above ground as should connecting pipelines. Location of this well however, is unacceptable. We concur with the Fort Mojave Indian Tribe to re-locate FW-INJ-2 further into the former Route66/ National Trails Highway right-of-way as this is less intrusive and does not require the construction of a new road, creating further desecration to the area.	As directed by DOI, these wells will be relocated and placed in belowground vaults. Also see response to comment #159 HA-21,	Comment and response noted.	Comment and response noted pending review of 60% design. During consultation meetings with the federal agencies, the tribes expressed their interest to have upland well structures below ground and move FW-INJ-2. The design will reflect the results of those discussions.		See Figure 3.0-1 of this BOD Report.
193	Hualapai-23 and TRC-14			Infrastructure Considerations **Pipelines**: The Hualapai, and others, completed a Topock site-walk on January 9, 2012 of the proposed 30% design pipeline infrastructure. After due deliberation, we concur with the Fort Mojave Indian Tribe to have all pipelines placed aboveground. By doing this, it is hoped that adverse effects associated with the remedy infrastructure will be minimized. Site location data for all pipelines will be maximized in this manner. Additionally, considerable remediation infrastructure, mainly a pipeline, is planned for Bat Cave Wash. Whether buried or at ground-level, this infrastructure will be subject to temporary inundation, scour, or burial as a result of future flood events in the wash. **TRC Recommendation:** It may be appropriate to complete a hydrologic and hydraulic evaluation of Bat Cave Wash to determine water surface elevations at key locations for design storm events of interest, e.g., the 100-yr storm / flood. In general - digital as-built/record drawings, based on accurate field surveys, should be prepared to document the placement of all project infrastructure, particularly subsurface elements. Further, all non-ferrous or non-conductive buried infrastructure (particularly pipelines) should be installed with detection tape or wire. These actions will serve to minimize ground and subsurface disturbance for modifications, repair or future removal. **Transformers:** It is understood that there are plans for 7 to 10 transformers necessary for electrical conversion. Hualapai concurs with the Fort Mojave Indian Tribe in that we prefer all transformers to be constructed aboveground. The design of the electrical system appears to conservative due to the length of each line. We asked that the electrical system be reviewed in regards to possibly reducing the number of required transformers.	As directed by DOI and DTSC, PG&E will modify the piping network to eliminate the piping/conduit segment in Bat Cave Wash. Also see response to comment #159, HA-21 for rationale on aboveground vs. belowground piping/electrical conduits; and response to comments #159 HA-21 and #183 HA-34 regarding transformers.	Comment and response noted. DTSC notes that the certified FEIR included impact analysis for underground piping where possible based on information provided by PG&E on the conceptual design. Although DTSC recognizes the Tribes recommendation for siting pipelines and electrical transformers above ground, as discussed with the Tribes during the 3/20 meeting, other factors such as safety and regulatory constraints must be balanced with cultural resource considerations. In response to comments received from the Fort Mojave Indian Tribe and Hualapai Indian Tribe DTSC has directed PG&E to modify the design to eliminate the piping/conduit segment in Bat Cave Wash and to replace this with the double-back loop along NTH.	The federal agencies have consulted with the Tribes on the 30% design with particular focus on this and related comments. The Tribes comments and the discussions which occurred during consultation meetings were considered in our direction to PG&E regarding modifications to the design including the implementation of the double-back loop along NTH, eliminating the BCW trenching. The federal agencies believe these design modifications take into account the impacts to the site and to some extent reduce the overall affects of the remedy on the cultural, religious, and spiritual values held by the Tribes for the TCP within the APE while recognizing our responsibility for protecting public safety and reducing ecological and visual impacts in the area.		See Figure 3.0-1 of this BOD Report.

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194	TRC-15			It is understood that the current locations proposed for remediation wells and infrastructure were initially placed with an attempt to consider both efficacy of the system, and minimizing surface disturbance. However, some current proposed locations of wells and infrastructure are not desirable for the Tribes. Placement of these structures and wells should be done with consideration to the preservation of the physical archeological resources, as well as in a way to minimize subsurface disturbance. **TRC Recommendation:** We understand that discussions and evaluations are ongoing on this issue with the Tribes, and specific alternate routes and well locations will be included in the 60% design as these discussions reach a conclusion.	Comment noted. As directed by DOI and DTSC, PG&E will modify the piping network to eliminate the piping/conduit segment in Bat Cave Wash, relocate upland wells (except UPGRAD-INJ-1), and place the wells in belowground vaults. An exception is the vault for UPGRAD-INJ-4. Since this well will be located in a wash, PG&E proposes that it be placed inside a semi-underground vault for easy access and to avoid water from inundating the vault in case of a flow event.	Comment and response noted.	The federal agencies have consulted with the Tribes on the 30% design with particular focus on this and related comments. The Tribes comments and the discussions which occurred during consultation meetings were considered with respect to the modifications to the design concerning well locations in the upland area as indicated in the response.		See Figure 3.0-1 of this BOD Report.
Section 4 Comments — Operations and Maintenance Provisions									
195	DTSC-76	Section 4 Operations and Maintenance Provisions		DTSC defers review of this section until sufficient information is provided to allow for a meaningful review.	Comment noted.	Okay.			
196	HA-25	p. 4-2, last para.		This text refers to the preparation of a “sampling and monitoring plan” as part of the 60% design submittal. The Tribe is interested in particular in the monitoring network configuration, including proposed new monitor well locations.	Comment noted.	The sampling and monitoring plan will be provided to the tribes as part of the 60% design review.	Comment noted.		See draft O&M Manual – Volume 2, Sampling and Monitoring Plan

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197	MWD-1	O&M Provisions		Metropolitan recommends that the following items be further developed in the forthcoming Draft Basis of Design Report/60% Design Submittal for the Final Groundwater Remedy because they are not addressed in the 30% Design Submittal. 1. Groundwater Monitoring Program (GMP), 2. Operation and Maintenance Plan (O&M), 3. Contingency Plan, and 4. Transition Plan from IM-3 to full Remedy Metropolitan believes these programs and plans are integral to successfully implementing and operating the remedy and to protecting the water quality of the Colorado River. Specifically, the GMP will need to identify and describe existing new wells that will become part of the program, the purpose of each well in the network, monitoring parameters, and monitoring frequency. Groundwater monitoring parameters should include both water quality and groundwater levels. Remedial Action Objectives (RAO) for water quality (surface and groundwater) and groundwater levels should be defined in the GMP for protection of the Colorado River and other sensitive habitats/sites and for process control measures to optimize elements of the remedy. The O&M Plan developed for the Groundwater Remedy System should be separate from the GMP and identify the means and measures for operating and maintaining the system. The Groundwater Remedy fail or compliance objectives are not met. Time frames should be included in the contingency plan for implementing corrective measures and they should be implemented in such a way that they are protective of Colorado River water quality and other sensitive habitats/sites.	PG&E appreciates MWD's recommendation and is committed to submit an O&M Manual that meets the substantive regulatory requirements. The O&M Manual will include the following: 1. O&M Plan – including routine O&M procedures, maintenance and site management practices. 2. Groundwater/Water Sampling and Monitoring Plan – including monitoring goals, compliance and performance monitoring, sampling methods, and data management practices. 3. Contingency Plan – including the in situ remediation system, compliance monitoring, remedy produced water management system, freshwater supply, power supply, and SCADA. 4. Soil Management Plan 5. O&M Health and Safety Plan Details of the transition from the IM3 system to the final remedy will be provided in the 60% design report.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal and O&M plan review.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal and O&M plan review.		See draft O&M Manual

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198	MWD-2	O&M Provisions		A plan needs to be fully developed and described in the 60% Design Report on the transition from the currently operating IM-3 Treatment Plan to full operation of the Groundwater Remedy. It is imperative that during the transition the hexavalent chromium plume in the floodplain is not allowed to migrate closer to or beneath the river, particularly if there is a possibility that portions of the plume would move beyond what could be captured by the Groundwater Remedy's Riverbank Extraction Wells. It is important to maintain the hydraulic gradient protecting the river during this transition period. In order to better understand changes in the plume as well as its movement during the transition period, the 60% Design Report should include a chemical reaction and solute transport simulation of the Transition Plan using the project's numerical model. The simulation time steps should be sufficiently small to take into account the hydraulic and chemical changes that are occurring as the elements of the remedy are brought online. The simulation should include the timing of the National Trails Highway In-situ Reductive Zone, extraction of fresh water at the Havasu National Refuge Well, injection of fresh water, activation of the Inner Recirculation Loop and activation of the Topock Compressor Station Recirculation loop. Modifications of the base Transition Plan should also be considered and simulated to better understand and optimize the transition to meet implementation objectives, including protection of the Colorado River's water quality.	The details of the transition from the IM3 system to the final remedy will be provided in the 60% design. During remedy transition and operation, some hexavalent chromium currently in the floodplain will move toward the river bank extraction wells where it will be captured. To the extent possible, the model will be used to evaluate the changes in the plume during the transition period. The shortest time step that is meaningful to model is one month so modeling will be supplemented with monitoring and adjustment during the transition period. As suggested, consideration of alternative sequencing of start-up of the system components will be evaluated to assess whether additional assurance of plume control can be obtained by modifying the sequence of start-up.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Section 7.3 of this BOD Report.

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199	Hualapai-10 and TRC-6	O&M Provisions		Evaluation and Application of In-Situ Pilot Scale Test Results There is concern that the values of oxidation-reduction potential (ORP) reported in the Topock reports are obtained from platinum-electrode measurements. These platinum-electrode values do not accurately represent the oxidation-reduction potential (Eh) of the subsurface geochemical conditions. Redox couples need to be analyzed (for example, Fe(III)/Fe(II) or Se(VI)/Se(IV) or As(V)/As(III)) in order to track the progress of remediation. The tracking of Eh conditions during remediation will give a more accurate representation of the subsurface redox conditions, and accurate Eh values can be used to describe geochemical speciation through theoretical Eh-pH diagrams. **TRC Recommendation:** It may be appropriate to discuss this during a TWG meeting, and incorporate in monitoring plans within the 60% design report.	The ORP measurements are made with a silver-silver chloride electrode, which is approximately 200 mV less than the standard hydrogen electrode used in reporting Eh values. We agree that this measurement alone provides only an approximate measure of the groundwater redox conditions. Laboratory measurement of redox indicators that will be part of the monitoring program include dissolved oxygen, nitrate, dissolved manganese, dissolved iron, and sulfate. Although more detailed speciation of oxidation state of iron, arsenic and selenium is possible, it is usually not necessary. For example, at the pH range of the site, iron measured in a dissolved iron analysis will likely be comprised of ferrous iron. For arsenic, the driving force for dissolution is the establishment of reducing conditions under which arsenic associated with iron minerals will be released during iron reduction, regardless of arsenic oxidation state. The measurement of dissolved iron and dissolved arsenic concentrations are typically sufficient to understand the establishment of metal reducing conditions and resulting changes in solubility of arsenic.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		
200	Hualapai-18 and TRC-11			Addressing Potential Byproducts, Arsenic, Other Metals The generation of byproducts, including arsenic, barium and manganese, in areas downgradient of the IRZ may be higher than that anticipated by the 30% design report. During the Upland ISPT, arsenic concentrations were reported as high as 97 µg/L in well PT-7D. Arsenic production in well PT-8S appears to be related to the reductive dissolution of manganese rather than sulfate reduction (Figure A2). Increased concentrations of barium in excess of the 1,000 µg/L MCL were observed during the Upland ISPT. **TRC Recommendation:** The monitoring program for the IRZ system should include background and then periodic analysis of Title 22 Metals, possibly annually for a selection of wells, to ensure excessive generation of unwanted byproducts is not occurring. It is anticipated to see this addressed in the monitoring program included in the 60% design report.	PG&E agrees that monitoring of arsenic, barium and manganese are integral components of the performance monitoring program, and these constituents will be included in the plan presented in the 60% design. The monitoring plan will be submitted with the 60% design for review and comment. With regards to the Uplands pilot test data referenced, the elevated concentrations of arsenic and barium measured in the Uplands pilot test were related to the distribution of higher than necessary amounts of organic carbon substrate during that pilot test. Lower concentrations are planned for the final remedy. The commenter is correct that arsenic dissolution is related to metals reduction, rather than sulfate reduction, although iron reduction and the release of arsenic associated with iron minerals may have played a more significant role than manganese reduction. The increase in barium concentrations is likely associated with sulfate reduction and the dissolution of barium sulfate.	Comment noted. Further evaluation will occur during review of 60% design.	Response noted. Further evaluation will occur during review of 60% design.		See Section 2.3 of this BOD Report and the draft O&M Manual – Volume 2, Sampling and Monitoring Plan.

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201	Hualapai-19			Addressing Potential Byproducts, Arsenic, Other Metals In addition, we support further analysis of the potential for increased arsenic concentrations resulting from injection of freshwater containing arsenic such as well HNWR1 which has arsenic concentrations in excess of 10 µg/L.	Additional analysis will be provided in the 60% design submittal.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See draft O&M Manual Volume 2, Section 5.2.
202	Hualapai-20 and TRC-12			Addressing Potential Byproducts, Arsenic, Other Metals Cr(VI) is unstable in the presence of TOC. Many samples which would be collected to monitor the NTH IRZ will also contain TOC as it is the amendment being introduced. Comparison of data from the Upland ISPT suggests field-analyzed Cr(VI) concentrations were greater than laboratory-analyzed Cr(VI) concentrations. This appears to be linked to high TOC concentrations in the water samples (Figure 2). Therefore, there needs to be a discussion regarding the differences between immediate field analyses versus standard laboratory-certified analyses and the possible impact of longer holding times on water samples analyzed for Cr(VI) where TOC is also present. **TRC Recommendation:** This may be appropriate for a TWG discussion. In addition, results of field and standard laboratory analysis should be compared to evaluate if field measurements of Cr(VI) are systematically different from companion laboratory samples. Other potentially unstable constituents should also be addressed, such as Fe(II) and S(II-). This will be important as the monitoring program for the remediation system is being designed.	US EPA methods will be used for all laboratory analyses of Cr(VI). These methods were carefully developed in US EPA laboratories and include detailed protocols for sample preservation to ensure that the target analyte concentrations are not altered during sample transport or storage prior to analysis. In response to this comment, a discussion of the laboratory and field methods for measurement of Cr(VI) will be included in the sampling and analysis section of the O&M plan that will be submitted in the 60 percent design. The impacts of the various reductants mentioned here, TOC, Fe(II) and S(II-) and holding time will be included.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See draft O&M Manual Volume 2 (Sampling and Monitoring Plan), Section 7.1.
203	Hualapai-21			Addressing Potential Byproducts, Arsenic, Other Metals Manganese concentrations might be the most persistent by-product of the remediation. Will manganese travel through the reducing layer beneath the Colorado River, then discharging into the river? What will be the manganese concentrations and loads in the Colorado River? Risk assessment models are needed to describe the effects of manganese concentrations on downstream wildlife and Tribal water users.	The solute modeling indicates that manganese concentrations generated as byproducts will be less than the current manganese concentrations already present in the reducing rind along the river. As noted in the response to comment #258, a more in-depth analysis of the spatial distribution of the reducing rind (Mn concentrations and geochemical redox indicators) will be considered for the 60% design. The net effect on the manganese concentrations in the river will also be evaluated. Additionally, a one-dimensional hyporheic zone model for Mn is also being developed for the 60% design, which will be used to evaluate geochemical/hydrological processes governing manganese behavior near the groundwater-river water interface as groundwater flows toward the river. Risk assessment models are not considered necessary.	Comment noted, please also see response to comment #258.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B.

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204	Hualapai-22 and TRC-13			<u>The Importance of Detailed and Focused Monitoring Plan</u> With the issues of potential byproducts, uncertainties with respect to heterogeneities in the local geology, and the uncertainties that come with any remediation system, it will be important that the monitoring program for the Topock IRZ be designed to monitor those parameters which modeling and experience indicate may be an issue. More intensive monitoring in the early years of operation would hopefully minimize any negative developments, as well as be able to allow the system to be modified quickly to response to developing conditions. **TRC Recommendation:** It is anticipated that a reasonably detailed monitoring program will be included within the 60% design report.	A detailed O&M plan will be included as part of the 60% design and include information related to organic carbon substrate distribution, chromium removal effectiveness, and by-product monitoring.	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		Also see draft O&M Manual, Volume 1 – Operations and Maintenance Plan and Volume 2 – Sampling and Monitoring Plan.
Section 5 Comments – Institutional Controls									
205	HA-26	p. 5-1, General		Can ICs be developed to further facilitate the intent of FEIR Mitigating Measure CUL-1a-2, which is intended to ensure unrestricted Tribal access to sacred areas? Could an IC address the restriction of access by non-Tribal members to such areas at certain times?	Consistent with the requirements of the Programmatic Agreement, there are access plans in place and/or underway to ensure Tribal access to, and use of, the project area for religious, spiritual, or other cultural purposes. For example, on November 26, 2011, BLM issued a Tribal Access Plan for Federal Properties, the purpose of which is to "assure the rights of Tribes to access their places of spiritual and cultural importance located on federal lands within the boundary of the APE." Access plans must be consistent with existing laws, regulations, and agreements governing property in the project area, including ICs. ICs function to ensure the health of humans and the environment, and to prevent interference with the final remedy by limiting access on specific property until access can be safely provided.	An IC can restrict specific use of the land, but DTSC cannot exclude non-Tribal members to certain areas based on tribal affiliations. ICs are for the protection of human health and the environment and to facilitate operation and maintenance of the remedial system. DTSC will be working with the federal agencies on the enforcement mechanisms of any necessary Institutional Controls at federally owned properties. .	The federal agencies are evaluating potential options for use restrictions for property under our jurisdiction.		

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206	DOI-51	Section 5		Please modify the first paragraph as follows: "Institutional controls (ICs) are a component of the selected final groundwater remedy. These are legal and administrative mechanisms adopted to limit or prohibit activities on specified property that could interfere with the integrity of the remedy or compromise the continued protection of human health and the environment. The target timeframe for having the ICs in place is prior to remedy construction. It is anticipated that most of these controls would remain in place for the duration of the remedy; that is, until the RAOs are achieved. The ROD states that the ICs adopted by the selected groundwater remedy for the Topock site are specified in the *BLM Lake Havasu Field Office Resource Management Plan* issued in May 2007 (BLM 2007) and in the *1994 Lower Colorado River National Wildlife Refuges Comprehensive Management Plan* (USFWS and BOR 1994). These plans restrict surface uses and use of the groundwater on federal lands." In the last paragraph, please remove the sentence, "The land use considerations included in the management plans identified above will be incorporated into restrictions on federal lands." As the first paragraph in this Section already states, the CERCLA ROD for the Topock groundwater remedy specifically states that ICs are imposed on the project area through the applicable federal management plans. Adding this sentence at the end of the Section is not necessary.	The paragraph will be modified as suggested.		Okay pending review of 60% design submittal.	Comment resolved.	See Section 5.0 of this BOD Report.

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207	DTSC-77	Page 5-2, Section 5.1, Define Areas for Future Restrictions, and Figure 5-1	The pumping scenarios include high-volume groundwater pumping (e.g., irrigation well) to the northwest at either Moabi Regional Park or along the eastern edge of San Bernardino County leased land, and a domestic water supply well (assuming one household with no lawn or swimming pool) within the BOR property area to the west of the plume and north of BNSF Railroad (APN 50-151-03 on Figure 5-1). Results from these initial simulations suggest an area for Category 1 restrictions as depicted in Figure 5-1.	What are the pumping parameters used? Also, what is the rationale for inclusion of one household with no lawn or swimming pool? Please provide the model simulation runs for evaluation. Finally, in Figure 5-1, DTSC notes that PG&E has identified an area roughly surrounding the remedy infrastructure for Category 1 ICs, but with little rationale.	The pumping scenario included a hypothetical extraction well at Park Moabi pumping at 400 gpm, a typical average rate for golf courses in this region (Source: Green, R.L. 2005. Trends in Golf Course Water Use and Regulation in California. UC Riverside Turfgrass Research Facility. Web publication: http://ucrturf.ucr.edu/). The pumping center was placed at different locations on Park Moabi with pumping rates assigned to model layers 2-4, and plume flow lines were examined. A hypothetical domestic well was also included outside of the plume footprint and placed at different locations to examine the potential for injected recirculation water flow lines to be drawn towards the well. Together, the simulation from pumping of these two hypothetical wells was used to define the area for Category 1 ICs. An additional simulation of the hypothetical domestic well was conducted, with additional features including a pool and lawn. The assumed average pumping rate of 1,440 gallons per day, based on water consumption of a quarter-acre lawn and maximum evaporative losses for pools in the Lake Havasu area The addition of these features makes virtually no difference in the simulation The closest potential domestic well location would eventually intercept freshwater injection flowlines, regardless of the domestic well pumping rate, but the recirculation water flowlines will not pass through the area outside of the IC boundary as shown on Figure 5-1, based on the current remedy configuration. PG&E is contacting the Topock Marina Resort to inquire about potential water use and source. Information obtained will be used to inform the evaluation of ICs in the 60% design. The level of details presented in Table 5-1B is typical at the 30% design stage when infrastructure and pipeline locations on most parcels are still changing. After the locations have been settled on specific parcels, land issues such as legal description, easements and encroachments will be determined and processed. Additional details will be presented in the 60% design submittal.	Okay pending review of 60% design submittal.		Comment resolved.	See Section 5.1 of this BOD Report.
				Furthermore, PG&E did not identify or outline the parcels requiring Category 2 ICs, which may limit potential future development of private parcels including those of the Topock Marina (see table 5-	Section 5.1 defines the area for Category 2 ICs. The level of details presented in Figure 5-1 and the section is typical at the 30% design stage when infrastructure and pipeline locations on most parcels are still				

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				1B). PG&E must adequately identify such impacts on the figure for transparency and evaluation. As stated, Figure 5-1 and the section do not appear to address institutional controls beyond Category 1. For Arizona, modeling in Appendix B indicates the remedy causes flow to Arizona and therefore potential for chromium or byproducts to escape capture during the remedy. Additionally, enhanced pumping in Arizona could exacerbate conditions (e.g., from the planned Topock 66 Resort and Spa). At a minimum, simulation of pumping wells in Arizona must be undertaken (low and higher flow scenarios). Depending on results, additional ICs may be needed in Arizona. Furthermore, PG&E argues that pumping at Park Moabi has detrimental effects on the remedy. If this is true, one would expect a larger area delineated for institutional controls. SoCal Gas had requested pumping rights in the area. If that is true, it should be discussed in this section as well as other applicable sections. Note: Parcel APN 650-151-03 referenced in the text could not be located on Figure 5-1. Please revise the figure or text.	changing. After the locations have been settled on specific parcels, land issues such as legal description, easements and encroachments will be determined and processed. Additional details will be presented in the 60% design submittal. Additional modeling is being done to simulate various pumping scenarios to evaluate freshwater supply sources. That information will be included in the forthcoming freshwater source evaluation tech memo, and will be used to inform the evaluation of ICs (in the 60% design). According to information from BLM (early 2011), SoCal Gas had planned for a well near the water tanks between I-40 and Moabi Regional Park. The well could be up to 500 feet deep and was intended for cathodic protection, and not for pumping of groundwater. The text will be revised to reference APN 650-151-05.				
Section 6 Comments – Preliminary Evaluation of Approvals, Permits, and Easement/Access Requirements									
208	DOI-52	Section 6.1		The Consent Decree should be referenced in this paragraph as well.	Comment noted. The final Consent Decree will be referenced when it is available.		Noted.	Comment resolved.	See Section 5.3.1 of this BOD Report.
209	DTSC-78	Page 6-1, Section 6.2, Anticipated Approvals/ Permits/ Agreements for Access to Non-Federal Lands		PG&E should also consider permits necessary for river intake from pipeline bridge, I-40 bridge, or railroad bridge. Based on location and ease of connection to existing infrastructure, DTSC would prefer to evaluate a river intake from or near the pipeline bridge.	DTSC's preference for evaluation of a river intake from or near the pipeline bridge is duly noted. As mentioned in previous responses, a technical memorandum will be prepared to present the evaluation of the three potential freshwater supply sources (wells in Arizona, River, wells in California) and to present PG&E's conclusion. Should a river intake is needed, PG&E will, in compliance with EIR Mitigation Measure BIO-3b, coordinate and cooperate with USFWS and other fisheries biologists to determine suitable and acceptable location(s) for the intake structure(s) to avoid spawning habitat of special status fish species.	Okay pending review of the Freshwater Supply TM.		Comment resolved.	See Appendix J of this BOD Report.

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210	HA-27	p. 6-1, Section 6.2 (Anticipated Approvals/Permits/Agreements for Access to Non-Federal Lands)		While PG&E has easements for access to the parcel now owned by the FMIT, whether these activities will involve any different or additional presence on this parcel should be clarified and the general statement about the Tribe's preference to limit such activity to the extent practicable should be referenced.	The 2006 Easement Agreement between the Tribe and PG&E covers access as well as activities such as operation and maintenance of facilities. The Tribe's preference is recognized and will be further considered during the development of the 60% design, consistent with the provisions of the Easement Agreement and the 2006 Settlement Agreement entered into between the Fort Mojave Indian Tribe and PG&E. A statement to this effect will be included in the 60% design submittal.	Comment and response noted.	Comment and response noted.		See Section 5.3.2 of this BOD Report.
Section 7 Comments – Compliance with ARARs and EIR Mitigation Measure Monitoring Program									
211	DOI-53	Section 7.0		In July 2011, the Office of Environmental Health Hazard Assessment (OEHHA) of California Environmental Protection Agency published a Public Health Goal (PHG) for hexavalent chromium of 0.02 parts per billion (ppb) or micrograms per liter (µg/L) in drinking water. Although this was not identified as an ARAR or TBC in the DOI ROD, given the high public interest regarding this goal, it may be appropriate to provide a short discussion in this section.	As DOI noted in the comment, although the PHG for hexavalent chromium is not an ARAR or TBC in the DOI ROD, given the high public interest regarding this goal, the following text could be added to Section 7.0 of the forthcoming 60% design submittal: On July 27, 2011, the Office of Environmental Health Hazard Assessment (OEHHA) established a public health goal (PHG) of 0.02 micrograms per liter (µg/L) for hexavalent chromium. The California Department of Public Health and OEHHA describe the PHG as follows: "A PHG is not a regulatory standard. It is only one step in the process of developing an enforceable standard that is set by the California Department of Public Health (CDPH) for drinking water that public water systems must meet. The PHG will contribute to California Department of Public Health's development of a primary drinking water standard (maximum contaminant level, MCL) that is specific for hexavalent chromium. Hexavalent chromium is currently regulated under the 50-micrograms per liter (µg/L) MCL for total chromium in California."	Okay.	Okay	Comment resolved.	See Section 6.2 of this BOD Report.
212	HA-28	Section 7.0		Specific laws relating to cultural concerns should be added to this section as well as applicable State laws. Additionally, State of California Governor Brown has issued directives regarding consultation with Native American Tribal Governments.	PG&E defers to DTSC/DOI Additionally, this section includes a reference to Table 7-3, which sets forth ARARs, including cultural resource laws that are ARARs.	Comment noted. DTSC will comply with all policies established as a result of the Governor's directives.	Comment noted. Within the CHPMP on pages 7 through 10; under Section 1.4 Regulatory Context there is an adequate discussion of Federal Law, ARARs and state law for both Arizona and California.		

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Section 8 Comments – Project Delivery Strategy/Updated Schedule									
213	HA-29	p. 8-2 et seq., Section 8.3 (Phasing Alternatives/Transition from Interim Measure to Final Remedy)		This section is of particular interest to the Tribe. As discussed in the general comments, the existence of the IM3 WTP on Tribal sacred grounds is causing significant spiritual distress and impact to the well-being of the Tribal Community. The criteria proposed to evaluate transition alternatives (Section 8.3.1) do not rigorously consider alternatives that could lead to a more rapid decommissioning of the IM3 WTP, which is of prime interest to the Tribe. PG&E should state whether there are any scenarios under which it is foreseeable that the IM3 WTP might be restarted after remedy startup and, should there be such reasonably a foreseeable scenario(s), develop a rationale that would support a more rapid determination to decommission the IM3 WTP based on plume control. It is not apparent within this section that such considerations were applied in the transition plan. Also, quarterly submittals of relevant data should be required following the completion of start-up of the National Trails Highway (NTH) In Situ Reductive Zone (IRZ) wells in order to determine progressively the trend towards achieving plume control and when plume control can reasonably be assured. With regard to the expectations of the Tribe, this section misdirects the key consideration of the removal of the IM3 facilities, instead emphasizing the termination of IM3 operations and dismantling of its associated infrastructure. (see p. 8-4, 1st full paragraph) In regard to the IM3 decommissioning decision, it is significant to note that in this same section it is stated that, during the transition from IM3 to the final remedy, the loss of hydraulic control exerted by the IM pumping would not pose a significant concern due to the slow migration rate of the contaminants as well as the capacity of the “reducing rind” to attenuate contaminants before reaching the Colorado River.	PG&E acknowledges the Tribe’s statement of its position regarding the decommissioning of IM-3. These topics are currently being addressed in confidential settlement discussions between the Tribe, DTSC and PG&E, and PG&E defers any response on these issues to those settlement discussions.	Comment noted. Decommissioning of IM-3 is the subject of litigation by the Fort Mojave Tribe.	Defer response.		In response this comment a discussion of criteria for approval for IM3 decommissioning plant has been added to Section 7.4 of this BOD Report.
214	HA-30	p. 8-3, 1st para. Section 8.3.2 (Evaluation of Proposed Transition Plan)		The first line should read “led” instead of “lead.”	The change will be made as requested.	Noted.	Noted.		See Section 7.3.2 of this BOD Report.
215	DOI-54	Section 8.3.3, Last Paragraph		The shutdown of IM-3 and the potential impacts to groundwater, perceived impacts to the Colorado River and, conversely, the potential impacts to the remedy from continued operation is of significant interest to the Tribes and stakeholders. It is recommended that this discussion be significantly expanded.	The details of the transition from the IM3 system to the final remedy will be further discussed in the 60% design as requested.	Okay pending review of 60% design submittal.	Okay pending further evaluation during the review of 60% design submittal.	Comment resolved.	See Section 7.3 of this BOD Report.

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216	DOI-55	Section 8.3/8-3 and 8-4/3rd and 4th bullets		The bullets indicate the operations will take 3-6 months. What are the criteria for successful start up necessitating a 3-6 month duration?	An allowance of 3 to 6 months for start up of the freshwater wells is provided in the preliminary design to allow for incremental start up of the extraction well and the injection wells in the uplands. Balancing and measurement of water levels near the injection wells will be required as well as adjustments if necessary. An additional 3 to 6 months is projected to start up the Riverbank and uplands injection wells along with the TCS and ER EW and TCS-IW system. These systems will involve balancing of the respective wells and injection points. In addition, if TOC needs to be added to the Riverbank well water, refinement and operation of the TOC injection components will be needed. There will be multiple wells to balance along with the existing network and system maintenance. Similar activities will be necessary for the ER-TCS loop.		Okay. Further evaluation will occur during the review of 60% design submittal.	Comment resolved.	See Section 7.3 of this BOD Report.
Tables									
217	DTSC-79	Table 3-1, Table 3-2, Table 3-3, Table 3-4		PG&E should provide more description for these tables to clarify if the well count column is also meant to describe the approximate well depth for each of those well? (e.g. Table 3-1, IRZ-1, 1 well with dual screens totaling 40 ft will be installed within the 64 foot layer 1 depth and another well with dual screens totaling 40 ft within the 126 feet layer 3 depth?) Are these proposal based on modeling or convenience since Table 3-1 are all within layers 1 and 3, while river bank extraction wells within Table 3-2 are all within layer 3? The rationale for selecting preliminary screen lengths should be discussed, as should the reason(s) for not establishing the preliminary lengths (well screen length identified as "TBD") in select wells. What screen lengths were used in the groundwater model? What criteria will be followed for locating the particular screen length within the model layer with its specific thickness (especially if the layer thickness is significantly greater than the well screen length)? Clarification is also requested regarding Footnote "d" on Tables 3-2 and 3-3 that indicate all amended water may be replaced with freshwater. What triggers that decision?	Revised Tables 3-1 through 3-4 will be included in the 60% design submittal. The preliminary well count in Tables 3-1 through 3-4 denotes the number of wells are present in each well cluster. Each well location ID may consist of a well cluster of up to two wells. Per Table 3-1, IRZ-1 consists of two dual screen wells. The first well will be screened in the two shallow zones (Layer 1 and Layer 2) and the second well will be screened in the two deeper zones (Layer 3 and Layer 4). The injection flows at each of the injection intervals has been established through groundwater modeling to effectively distribute carbon within the IRZ, and the flow rate may therefore be much less than formation can accept, and a portion of the screen may see little or no flow. These stagnant areas provide ample surface area for unwanted biomass buildup that can exacerbate fouling issues, thus "oversizing" the screen can have a deleterious effect. Therefore, each screen will be a maximum of 40 feet long (a screen length that has been demonstrated to be effective for carbon amended injection). The placement of screens was chosen based on the portions of the aquifer containing contaminants requiring remediation and will likely be modified during the advancement of the remedy design and further modified in the field during installation activities. For the River Bank Extraction Wells only one well per	Okay pending review of 60% design submittal.		Comment resolved.	See Tables 3.2-1, 3.2-2, 3.2-3, and 3.3-1 and Appendix C (Design Bulletin: Remediation Well Design and Field Construction Approach).

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					location is proposed. These wells will be a screened in Layers 3 and 4 to minimize the migration of manganese, iron, and other reduced species from the river's naturally occurring reducing rind, which is present in the shallower layers surrounding the river. The purpose of this is to minimize fouling of the extraction well and conveyance piping, as well as minimize the placement of manganese (and other species of concern) within the river's reducing rind into the upgradient groundwater plume via the inner loop injection well network. The rationale behind well screen lengths identified as "TBD" (Tables 3-2 to 3-4) is that the specifications for these future wells will be determined during the 60% design. For modeling purposes, the upland injection wells inject into model layers 1 through 4 (Appendix B, Section 4.4.3). The preliminary screen lengths were chosen based on the initial estimates of thickness of saturated sediments and the thickness of target contaminated zones within the saturated sediment. Well screen lengths will be included in place of "TBD" for the upland injection wells and east ravine extraction wells in the 60% design submittal. It will also be noted where field-encountered aquifer characteristics or other factors may affect the final screen lengths. Footnote "d" on Tables 3-2 and 3-3 attempts to explain that the aggregate minimum and maximum flow rates for each well network and will not be equal to the sum of individual well flow rates. It should be noted that some of the wells could be operating at maximum conditions, while others are operating near the minimum conditions (or not operating at all). Carbon-amended water injections may be replaced with freshwater injections at upgradient locations if it is found that a decrease in carbon dosage is necessary to reduce the mobilization of in-situ by products beyond the plume footprint.				

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218	DOI-56	Table 7-3 Summary of Identified ARARs, Action Specific, Item No. 48		Please include a discussion of the current well design of the HNWR well in this paragraph.	Based on information provided in a November 24, 2010 electronic mail from Bradley Guay (USACE) to Curt Russell (PG&E), the HNWR well is 10-inch diameter well and extends to a depth of 156.5 ft below land surface with a stick up of approximately 2.75 feet. The upper 116 feet of the well is welded, 10-inch mild steel casing. Between 92 and 116 feet, the steel casing was perforated after installation to open this section of the well to the aquifer. Below 116 feet, a 0.030” slot well screen was installed. The type or material of well screen was specified in the information provided in the electronic mail. The test pump intake was set at a depth of 88 feet. There was no information provided about the grout or gravel pack in this well. Since HNWR well is an existing well, this information will be included in Section 3.3 (Freshwater Supply) of the 60% design submittal and the forthcoming Freshwater Supply Source Evaluation Technical Memorandum.	Okay pending review of 60% design submittal.	Noted. The upcoming report from the USFWS should be used to update the information provided in PG&E’s response when it becomes available.	Comment resolved.	See Section 3.3 of this BOD Report
219	DOI-57	Table 7-3 Summary of Identified ARARs, Location Specific, Item Nos. 5 & 7		The “action” notation should include a reference to the DOI ROD, surnamed by BLM, BOR, FWS and BIA.	A reference to the DOI ROD will be added Table 7-3 as directed, in the 60% design submittal.		Okay pending review of 60% design submittal	Comment resolved.	See Table 6.2-1 of this BOD Report.
220	DOI-58	Table 7-3 Summary of Identified ARARs, Location Specific, Item Nos. 14, 17, & 22		Please update the “action” for the ARAR addressing the PA, Tribal Access Plan, and CHPMP. Additionally, it should be noted that a treatment plan will be developed throughout the design process.	The “action” column will be updated with current information in the 60% design submittal. Treatment measures are contained in the CHPMP and the EIR.		Okay pending review of 60% design submittal	Comment resolved.	See Table 6.2-1 of this BOD Report.

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221	DTSC-80	Table 7-3 Summary of Compliance with Identified ARARs		Item 2, 52, 99, 100, 101, 32: Discuss the arsenic MCL and how arsenic concentrations above this level are currently proposed to be injected outside the contaminant plume in the last column on the table. Item 53, 99, 100, and 101: Discuss secondary MCLs of the byproduct manganese in the last column on the table. Item 35: Would this ARAR be in effect if a river intake structure were selected? Item 47: This item states, “Most of the groundwater that is withdrawn will be reinjected into the aquifer. Any groundwater that is withdrawn but not reinjected into the aquifer shall be put to reasonable and beneficial use.” Please clarify/list the water uses of freshwater supply other than for reinjection. These uses do not seem to be accounted for in the design needs for the supply well which is only evaluated as a source for injection. Item 51: Mention that elevated arsenic in Arizona wells may require treatment.	**Item 2** – inserted text is shown in underline typeface, delete text is shown in ~~strikeout~~ typeface: Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the federal maximum contaminant level (MCL) for Cr(T) of 100 µg/L. There is no federal MCL for Cr(VI) and the RAO of 32 µg/L (based on the regional background concentration) has been established at the conclusion of remedy implementation. ~~Although~~ ~~c~~ Concentrations of Cr(VI) and arsenic as in situ byproducts may fluctuate above baseline levels within the treatment area during remedy implementation. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project’s Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10ug/L, which is typical of water quality in the vicinity of Topock, Arizona . Modeling indicates that arsenic concentrations that may temporarily be elevated by **~~a) the injection of this water and b)~~** the generation from insitu remediation will attenuate under site conditions and return to pre-remedy baseline levels after the end of active remediation. Institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional controls. **Item 32** This item states that “The preliminary (30%) design includes facilities in the jurisdictional water of the US (see Figure 2-16). PG&E will work with the USACE to ensure compliance with the substantive requirements of Section 404 per CERCLA Section 121(e)(1). It is anticipated that a wetland delineation will be conducted in the Spring of 2012.” The DTSC comment does not appear to be relevant to this item. **Item 35** This ARAR applies if the river intake structure has the potential to affect navigable waters on the site.	Agree with Response pending review of the 60% design submittal. However, please note the following concerns : Item 2 – the comparison of UTL, which is the upper end of the background range, with generated concentrations of As above MCL must be carefully evaluated. While in nature, there will be natural variations and some concentration above MCL levels may exist (up to or exceeding UTL), This phenomenon should not be viewed as appropriate to leave chemicals above the MCL after active remediation beyond the current plume boundary because there is within a probability of detecting concentration at the UTL. If the generated concentrations are on par with the mean natural value and occasionally have detection reaching UTL, then the scenario is more like nature.		Comment resolved.	See Table 6.2-1 of this BOD Report. The text shown in bold strikeout typeface in PG&E Response to 30% Design Comment of this comment, is to reflect that in this 60% design, HNWR-1 water is pre-treated prior to injection.

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					Item 47 The 30% design states that the extracted groundwater is for freshwater injection and for Compressor Station operational use. The Compressor Station currently receives its water from well Topock-2 and 3 in Arizona. **Item 51** The Arizona Action-Specific ARAR (A.R.S 49-282.06(A)(2)) states that “To the extent practicable, provide for the control, management or cleanup of the hazardous substances in order to allow the maximum beneficial use of the waters of the state”. PG&E understands that this ARAR applies to the control, management, or cleanup of hazardous substances in the State of Arizona. The 30% design does not involve treatment or cleanup in Arizona. The DTSC comment does not appear relevant to this item. **Item 52** – inserted text is shown in <u>underline</u> typeface, delete text is shown in ~~strikeout~~ typeface: Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the state maximum contaminant level (MCL) for Cr(T) of 50 µg/L. There is no state MCL for Cr(VI) and the RAO of 32 µg/L (based on the regional background concentration) has been established at the conclusion of remedy implementation. ~~Although c~~ <u>C</u>oncentrations of Cr(VI) and arsenic as an in situ byproduct may fluctuate above baseline levels within the treatment area during remedy implementation. <u>In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project’s Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10ug/L, which is typical of water quality in the vicinity of Topock, Arizona . Modeling indicates that arsenic concentrations that may temporarily be elevated by</u> **~~a) the injection of this water and b)~~** <u>the generation from insitu remediation will attenuate under site conditions and return to pre-remedy baseline levels after the end of active remediation.</u> Institutional controls will prevent use of affected groundwater as a drinking water source until the remedy is complete.	Item 52 – The modeling result which suggests that Arsenic will attenuate and not be mobile in any extensive direction beyond the injection well remains to be proven. DTSC agrees that the pilot test appears to support that conclusion; however, it will become PG&E’s liability if the remedy creates an Arsenic plume that does not attenuate with time or distance. PG&E must develop robust monitoring and contingency plans to ensure that arsenic will be under control during the remedy. PG&E’s response is noted and DTSC will review the 60% design submittal when available.			

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					Groundwater monitoring will be used to track performance of the remedy and verify that RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional controls. **Item 53 –** inserted text is shown in <u>underline</u> typeface**:** There is no secondary MCL for Cr(VI) or Cr(T). Secondary MCLs are community acceptance standards for constituents that may adversely affect the taste, odor, or appearance of drinking water. <u>Concentrations of insitu by-products (arsenic, manganese (secondary MCL of 50ug/L)) may fluctuate within the treatment area during remedy implementation</u>. An institutional control will be enforced throughout the chromium plume area during implementation of the remedial action to prohibit use of the groundwater as drinking water source.	Item 53 - PG&E is correct that there is no secondary MCL for Cr(VI) or Cr(T). However, despite PG&E's statement that secondary MCLs are "community acceptance standards," they are nevertheless a regulatory standard for California drinking water. Although PG&E states that there will be ICs to prevent use of affected water for drinking water, the basin plan, which is an ARAR, dictates that the water is designated for beneficial uses. Therefore, ICs are not to change the designation of which the clean-up standards at remedy completion must be based.			
					Item 99 – inserted text is shown in <u>underline</u> typeface**:** Compliance with this requirement will be achieved by reducing the concentration of Cr(T) in the affected aquifer to a concentration below the federal and state MCLs of 100 µg/L and 50 mg/L respectively which represent the chemical concentrations in drinking water considered safe for human consumption. There are no MCLs or MCLGs for Cr(VI) and the RAO of 32 µg/L (based on the regional background concentration) has been established at the conclusion of remedy implementation. <u>Concentrations of Cr(VI) and in situ byproducts (e.g., arsenic, manganese) may fluctuate above baseline levels within the treatment area during remedy implementation. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10ug/L, which is typical of water quality in the vicinity of Topock, Arizona . Modeling indicates that arsenic concentrations that may temporarily be elevated by</u> ~~**a) the injection of this water and b)**~~ <u>the</u>	Item 99 –The action specific ARAR designated the site ground water to be beneficial for municipal and domestic water supply. PG&E should ensure that the water quality will be properly restored to ambient conditions not just for Cr(VI) but also for any chemicals that will be generated or introduced.			

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					<u>generation from insitu remediation will attenuate under site conditions and return to pre-remedy baseline levels after the end of active remediation</u>. <u>Modeling also indicates that manganese generated from insitu remediation does not exceed the upper tolerance level of background manganese concentration at the site</u>. The final groundwater remedy includes an institutional control to restrict use of the groundwater for potable use until the remedy is complete. Groundwater monitoring will be used to track performance of the remedy and verify that the RAOs have been achieved at the conclusion of remedy implementation and prior to removing the institutional control. **Item 100** – inserted text is shown in <u>underline</u> typeface: Surface water sampling in the Colorado River near the site show concentrations of Cr(T) less than the federal and state MCLs of 100 µg/L and 50 mg/L (drinking water supply standards). Surface water sampling in the Colorado River also show concentrations of Cr(VI) less than the California Toxics Rule criteria of 11 µg/L (protection of freshwater aquatic life). Reducing Cr(VI) concentrations in groundwater by implementation of the remedy will increase the level of certainty that surface water quality will continue to remain below these levels. PG&E will prepare an O&M Plan, Progress Reports, and a Corrective Measure/Remedial Action Completion Report. The remedy is intended to restore groundwater to the regional background Cr(VI) concentration of 32 µg/L, thereby addressing any contribution by PG&E affecting potential beneficial uses. The operation of the River Bank Extraction Wells will prevent migration of contaminants to the Colorado river that could impact beneficial uses or result in a failure to meet surface water quality objectives <u>The remedy is also designed and will be implemented to control the generation and migration of insitu by-products (arsenic, manganese). The MCL for arsenic is 10ug/L and the secondary MCL for manganese is 50ug/L. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in</u>	Item 100 - Similar to above, under basin plan and ARAR compliance, PG&E is also obligated to restore the groundwater to ambient conditions not just for Cr(VI) but also for any chemicals that will be generated or introduced.			

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					water from the well exceeds the MCL of 10ug/L, which is typical of water quality in the vicinity of Topock, Arizona. Modeling indicates that arsenic concentrations that may temporarily be elevated by **~~a) the injection of this water and b)~~** the generation from insitu remediation will attenuate under site conditions and return to pre-remedy baseline levels after the end of active remediation. Modeling also indicates that manganese generated from insitu remediation does not exceed the upper tolerance level of background manganese concentration at the site. **Item 101 –** inserted text is shown in underline typeface: PG&E will prepare an O&M Plan, Progress Reports, and a Corrective Measure/Remedial Action Completion Report. Although concentrations of Cr(VI) and insitu by-products will fluctuate inside the footprint of the remedy during implementation, at the conclusion of the remedy the RAOs will be achieved. In addition, as part of the remedy fresh water from a well in Arizona will be injected west of the plume, within the project's Area of Potential Effects. The naturally occurring arsenic concentration in water from the well exceeds the MCL of 10ug/L, which is typical of water quality in the vicinity of Topock, Arizona. Modeling indicates that arsenic concentrations that may temporarily be elevated by **~~a) the injection of this water and b)~~** the generation from insitu remediation will attenuate under site conditions and return to pre-remedy baseline levels after the end of active remediation. Modeling also indicates that manganese generated from insitu remediation does not exceed the upper tolerance level of background manganese concentration at the site. Therefore, the remedy will comply with the substantive provisions of the SWRCB Resolution 68-16 that requires maintenance of the highest water quality consistent with maximum benefit to the people of the State, and with the substantive provisions of SWRCB Resolution 92-49 that require restoration of background water quality.				

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222	DTSC-81	Table 8-1		DTSC understands that this is a cross reference table copied from the CMI/RD work plan. However, please note that the target dates for document submission have clearly changed. PG&E should update the table accordingly. Please also note that the table referenced other tables that are not in the 30% design (e.g., Table 4-5 for content of various design submissions). DTSC suggests a checklist format with locations within the document instead of the proposed table. The checklist can allow reviewers to know that the specific item has been completed and its location within the document at a glance.	PG&E will update the target dates in Tables 8-1 and 8-2 to reflect current schedule at the time the 60% design is submitted. In response to DTSC's comment, PG&E proposes to include a table similar to Exhibit 1-3 of the Revised CMI/RD Work Plan.	Okay pending review of the 60% design submittal.		Comment resolved.	See Tables 7.2-1, 7.2-2, and 7.2-3 of this BOD Report.
Figures									
223	DOI-59	Figure 2-17		This figure shows IRZ wells locations in the floodplain. Previous documents have noted that the wells would be located along the National Trails Highway (NTH) or possibly in the floodplain. Please justify the location of the wells within the floodplain area rather than along the NTH.	For safety reasons, PG&E has located the IRZ wells out of the NTH traffic lanes, on the road shoulder where available. Where road shoulder is not readily available, such as on the east side of NTH north of the MW-20 bench, PG&E has located wells in areas that minimize removal of vegetation and mature plants. The proposed well locations on Figure 2-17 accomplished both of these objectives.	Okay pending review of 60% design submittal.	Okay.	Comment resolved.	See Figures 2.4-6 and 3.0-1 of this BOD Report.
224	DOI-60	Figure 3-1		Building "M" is incorrectly labeled in the inset map according to the legend description which includes "L" but not "M". Please review and revise as necessary.	This figure will be revised in the 60% design submittal.	Okay	Okay pending review of the 60% design submittal.	Comment resolved.	See Figure 3.0-1 of this BOD Report.
225	DOI-61	Figure 3-1		Notes 1 and 3 should indicate Appendix D not C for the engineering drawings. Also, in the legend under Pipeline for Remedy, the words "pipeline" and "pipe" should end with (s) to indicate these may not be single pipelines.	This figure will be revised in the 60% design submittal.	Okay	Okay pending review of the 60% design submittal.	Comment resolved.	See Figure 3.0-1 of this BOD Report.
226	DTSC-82	Figure 3-1		Where would FW-INJ-3 (future well) potentially be located. Please summarize how this well came to be an optional well in the document.	See response to comment 155 DOI-37.	Okay pending review of 60% design submittal.		Comment resolved.	See Figure 3.0-1 of this BOD Report.
227	DOI-62	Figures 3-4 through 3-9		Please define the model layers on each figure.	The model layers will be further labeled to reflect the corresponding hydrogeologic units displayed in the cross-sections.		Okay pending review of the 60% design submittal.	Comment resolved.	See Figures 3.1-2 through 3.1-7.
Appendix B – Groundwater Modeling									
228	DOI-63	Appendix B Cross Sections		The proposed well screens should be identified on the cross sections.	Well screens will be added to the wells presented in the Appendix B cross-sections.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Figures 6.4-3 to 6.4-8.

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229	HA-31			This appendix provides an overview of groundwater flow model development, but does not present sufficient detail to understand various decisions that were applied to arrive at the final model configuration on which the final remedy design was based. For example, how was the model calibrated, specifically what was the basis for assigning individual parameters over the range of available field data? What constraints were applied? What is the range of uncertainty? Between the time that the 2005 flow model was developed and the appearance of this new flow and transport model, little specific information on model development was presented to stakeholders, only the results. What configurations were considered to arrive at the design presented? What was/were the goal(s) of model optimization? Within these comments, the Tribe has emphasized the importance of siting to avoid impacts and desecration to sacred areas. Were any constraints applied to consider such avoidance? Were any scenarios considered that specifically addressed a startup strategy that would allow for a more rapid release of the IM3 WTP? Regardless of the answers to these questions, the Tribe is disappointed that the development of this model, the basis for design, was not communicated with the Tribes, Agencies, and Stakeholders in a transparent way. The Agencies should direct more open discussions and information exchange in this regard moving forward and particularly during remedy startup.	The calibration procedure was explained in CH2MHILL 2005 and describes the assignment of hydrogeologic parameters. The flow model was calibrated against (a) long term average groundwater levels, (b) average monthly floodplain levels responding to fluctuating river levels, (c) short-term responses to pump testing events, and (d) plume development over time. The autocalibration program PEST was employed to refine the calibration and to reduce effects of uncertainty in each calibration target. The solute transport model was based directly on the original flow model and honors all of the hydrogeologic parameters and boundary conditions. With respect to the uncertainty in the solute transport model, a sensitivity analysis was conducted with respect to the simulated parameters in section 6 of Appendix B. Text can be added to expand on the associated uncertainty. Several configurations were considered in the development of the groundwater flow and transport model. Well locations were carefully selected first by avoiding culturally or otherwise sensitive areas to minimize impact. This included closely evaluating delineated areas and avoiding sensitive areas during well placement. The next criteria was to optimize the well locations to minimize the number of necessary wells while still maintaining effective treatment to minimize the remedial timeframe. A careful balance of these criteria were evaluated until the optimal well layout was established. Several of these scenarios were presented prior to submittal of the 30% design report to reflect the reasoning We welcome open discussions and feedback regarding the remedial system design.	DTSC is perplexed as to the origin of the comment that the model development was not communicated with the Fort Mohave Indian Tribe. Based on review of our records, DTSC has facilitated several discussions on the model over the years so that questions associated with its development and use could be addressed. Some of these meetings held after the 2005 model calibration included the August 19, 2008 discussion on the use of the 5 layer models in the remedial selection process, the January 22, 2009 meeting at USGS office in San Diego, a two day meeting on September 1 and 2, 2011 on input parameters, and the October 18, 2011 meeting specifically on the modeling basis, uncertainties and results as it was applied to the remedy design. In addition, DTSC notes that we have responded to many questions raised by the FMIT via email on this same topic. However, DTSC acknowledges that the solute transport model included in the design is far more complex in nature than the original flow model, but such complexity is not unexpected. As always, DTSC will continue to facilitate meaningful discussions between PG&E and Tribes and/or Stakeholders regarding this matter.	Comment and response noted. DOI acknowledges the complexity of the fate and transport model, and to a lesser extent, the flow model and has requested the PG&E included further discussions in the forthcoming Fresh Water Technical Memorandum and the 60% design submittal. The agency encourages continued Tribal participation in the upcoming Consultative Working Group and Technical Working Group meetings planned throughout the design process.		See Appendix B, Section 4.
230	HA-32			Additionally, the Tribe notes that the TRC has provided a number of comments on model uncertainties, scenarios, etc. (Attachment A). The Tribe wishes to underscore these comments and approves them on behalf of the FMIT.	Comment noted. PG&E have responded to the TRC comments in Attachment A, and included those responses in this table.	Noted	Comment noted		

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231	DOI-64	App. B, Section 2.2		The first paragraph of this section discusses the primary components of the groundwater flow system, citing five items. The conceptual hydrogeological site model should address each of these items in order to provide the framework necessary for development of the numerical flow model. DOI believes that it is important that the conceptual site model be thoroughly documented so that the basis of the subsequent mathematical model can be understood and critically assessed. This section, and in particular Section 2.2, is very abbreviated, with no discussion of several of the items called out in the first paragraph, and no basis for appreciating the hydrogeologic complexity of the site. Furthermore, while it is recognized that groundwater flow modeling has been ongoing at the site for many years, with comprehensive documentation, fate and transport modeling has not been previously presented. This model represents a significant revision warranting a more thorough discussion of the conceptual hydrogeologic and contaminant fate and transport site model as the basis for the numerical model in this section.	Conceptual model section will be expanded to provide a more thorough treatment of the subject at the beginning of the appendix for the 60% submittal.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 2
232	DOI-65	App. B, Section 2.2, 2nd paragraph		This section mentions the occurrence of groundwater only in the alluvial aquifer at the site. Groundwater is also known to occur in consolidated bedrock. Previous to the discovery of contamination in bedrock groundwater in the East Ravine, bedrock groundwater was discounted as a potential contaminant migration pathway. With the East Ravine findings, the occurrence of groundwater in bedrock should be discussed in this section of the conceptual model. In doing so, it should be noted that limited information exists on the nature of the fracture flow and groundwater flow directions in the East Ravine area. Studies are ongoing. Also, with the recent findings at Site H in the East Ravine, PG&E should avoid statements that fracture flow in the bedrock is necessarily of limited flow rate and radius of influence.	Text will be added to discuss the groundwater in bedrock based upon the studies conducted to date. This will include discussions of how the bedrock groundwater behaves in the East Ravine area as well as conditions observed at Site H. Refer to response to comment #10 DOI-9.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See Appendix B, Section 2.2.
233	DOI-66	App. B, Section 3, 2nd paragraph, last sentence		This section of Appendix B refers the reader to Section 3.1 of the main report for a summary of the updates to the groundwater flow model, while Section 3.1 of the main report refers the reader to Appendix B for the same information. DOI recommends that the most detailed discussion of the modeling, including the conceptual hydrogeologic and fate and transport models, and the model code selection and implementation descriptions be presented in Appendix B, with the important concepts summarized in Section 3.1 of the main report.	The reference of the groundwater flow model details should have pointed to Hill 2005 and 2009. The solute transport model code selection and the groundwater submodel code selection are explained in detail in Appendix B. Further information with respect to the conceptual hydrogeologic and fate and transport models will be added to Appendix B. Appendix B will serve as a comprehensive documentation of the model. Section 3 will provide a summary level discussion that highlights primary design-related modeling conclusions.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Section 3.1 of the BOD Text and Appendix B.

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234	DOI-67	App. B, Section 3.3, 1st paragraph, 2nd sentence		There appears to be a typographical error in this sentence. It appears "is' should be replace with "of".	Text will be edited.	Ok	Ok		See Appendix B, Section 4.3.
235	DOI-68	App. B, Section 3.3, 1st paragraph, 3rd sentence		It is not apparent that a north-south oriented grid is necessarily aligned with the direction of groundwater flow, which is northeastward over much of the area.	This sentence will be deleted in the 60% submittal.	OK.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 4.3.
236	DOI-69	App. B, Section 3.3, 1st paragraph, last sentence		This section states that the submodel domain boundaries are constant head boundaries, while Section 3.4 states that the boundaries are constant flux boundaries.	Text will be corrected. Boundary conditions are constant flux cells.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 4.3.
237	DOI-70	App. B, Section 3.3 2nd paragraph		This section refers to the thickness of layers in the "solute transport submodel", but this section is actually discussing the groundwater flow submodel domain. This is potentially confusing. Also, it is unclear by what is meant by the statement that the upper four layers in the southern bedrock portion of the model "…no longer are consistent with the alluvial portions of these layers to the north". In what way are they not consistent? Please clarify.	Text will be revised to reflect a single flow and transport submodel. South of the bedrock contact, the upper four layers in the groundwater flow submodel represent bedrock, whereas to the north of the bedrock contact, the 4 layers represent the alluvial aquifer. Therefore the hydraulic conductivities vary within the layers to represent the different lithologies. Text will be changed to make this point more clear.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 4.3.
238	DOI-71	App. B, Section 3.4		The use of constant flux boundaries seems reasonable if the distances from the boundaries to aquifer stressors (e.g., pumping and injection wells) are sufficient so as not to inappropriately constrain fluxes at the boundaries. In this regard, DOI would like assurance that the model is appropriately simulating boundary conditions under remedial action conditions in two areas; west and north of the fresh water injection wells and along the eastern boundary nearest the fresh water supply well in the HNWR. Also, please clarify what is meant by the statement "The final boundary conditions simulated in the submodel domain are the well cells which represent the proposed extraction and injection locations for the various remedial scenarios."	Because the submodel was extracted from the regional flow model, the boundary conditions reflect the actual pumping conditions within the model domain. Therefore the fluxes at the boundaries are not inappropriately constrained. The text will be modified to identify the three types of boundary conditions within the submodel. The sentence quoted in the comment represents the third type of boundary condition.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 4.4.
239	DOI-72	App. B, Section 3.5, last sentence		Please revise the last sentence to say "All hydraulic conductivity values in the submodel were assigned on the basis of the ORIGINAL groundwater flow model properties", if in fact, this is the case.	The hydraulic conductivity values in the submodel are the exact same values in the regional groundwater flow model from which the submodel was extracted. Text in the 60% submittal will be edited to reflect the suggested sentence.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 4.5.
240	DOI-73	App. B, Section 4.1, 3rd bullet		Change "on" to "of"	Text will be changed.	Okay	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 6.1.

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241	DOI-74	App. B, Section 4.2.1		This section addresses mobile and immobile porosity. Please provide more support for this assumed value for this important parameter. Simply referring to the cited textbook is not sufficient. Please provide a detailed discussion of why a textbook value is reasonable for this model. Provide a discussion on how sensitive the model results are to this assumed parameter. If highly sensitive, which DOI expects, are there ways to better estimate the conditions for this site, rather than solely relying on textbook values?	Site in situ pilot tracer studies, along with breakthrough of IM3 injection water, were also used to estimate mobile porosity. Text will be added to document these site-specific sources of data and how they were used to estimate porosity.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 6.2.1.
242	DOI-75	App. B, Section 4.2.2		DOI has previously been told by PG&E that calibration of the fate and transport model is infeasible because it is not possible to reliably simulate the generation of the current plume from its release in BCW. However, this section seems to be saying that the mass transfer coefficient parameter was somehow evaluated by adjusting it to produce “reasonable plume movement”. This concept is not clear and warrants further explanation.	It is correct that the calibration of the fate and transport model is infeasible because it is not possible to reliably simulate the generation of the current plume from its release in BCW wash. The mass transfer coefficient was developed based on literature values and models of similar dimensions and aquifer properties, and testing with the model. Small scale and short term plume movements were evaluated with a range of mass transfer coefficients. The text will be updated accordingly.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 6.2.2.
243	DOI-76	App. B, Section 4.2.4		DOI had understood that this relationship of Cr (VI) degradation with TOC concentration was based on observations during the in-situ pilot tests, however no mention is made of that in this section. Please amplify on the basis for these critical assumptions and why 0.1 ppm is the point at which this process occurs. DOI has understood that the target TOC concentration for the IRZs is 100 ppm.	A section will be added to Appendix B discussing the results of in situ pilot tests and how these results were used in deriving a target TOC concentration for the remedy. A more detailed discussion of the various TOC target and trigger concentrations used in the model will be included in the 60% submittal.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 3.4.1.
244	DTSC-83	Appendix B, Page 9, 4.2.4 Chromium Reduction	To account for this, the model assumed hexavalent chromium reduction/precipitation whenever the injected carbon exceeds a concentration of 0.1 parts per million (ppm). At the same time, a carbon half-life of 20 days was assigned to account for the degradation of the injected carbon over time.	Up to this point, Arcadis has provided a logical rationale for the parameters selected for the solute transport model. However, no rationale was provided for the parameters cited in the quoted text. This section should provide examples or reference specific sections of other documents that verify the 0.1 ppm carbon concentration is an appropriate value for the completion of chromium reduction (as well as the point at which arsenic and manganese begin to sorb and precipitate).	Refer to response to comment # 243, DOI-76. Additional detailed discussion of byproduct generation will be added to Section 4.2.6 of Appendix B and attenuation mechanisms will be detailed in 4.2.7 of Appendix B.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 3.4.1.
245	DOI-77	App. B, Section 4.2.5, 3rd sentence		The sentence seems to have a typographical error. Is the intent of the sentence to say that, for initial conditions, the Cr (VI) concentrations in the mobile and immobile portions of the aquifer are in equilibrium?	Yes, the revised sentence is “The initialized hexavalent chromium distributions are the same in both the mobile and immobile aquifer portions.”	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 6.2.5.

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246	DTSC-84	Appendix B, Page 9, 4.2.5 Chromium Reduction		The initial hexavalent chromium contaminant plume maps (B-13 to 16) will need to be updated to include all recent data including the highest concentration detected to date in well MW-68-180 (22,000 ug/L) located on the compressor station. It will be interesting to see if this new concentration affects cleanup model runs.	Plume maps will be updated with plume characterization data collected through January 2012.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 6.2.5. Plume maps were updated with plume characterization data collected through February 2012.
247	DOI-78	App. B, Section 4.2.6, last paragraph		The first sentence appears to actually be two separate sentences. The relationship of Cr (VI) reduction, Mn and As generation, and Mn and As persistence in dissolved form would benefit from a concentration versus TOC concentration plot that shows all three constituents. It appears from the various sections of text, and the referenced CMS-FS plots that Cr (VI) reduction begins when organic carbon concentration is above 0.1 ppm, Mn and As dissolution begins at about 10 ppm, and Mn and As precipitation begins at about 0.1 ppm.	Yes, it should be adjusted to two sentences and corrected. Within the model, both Mn and As generation/ dissolution will occur in the presence of any degrading TOC and is not limited by TOC concentration. However with respect to precipitation, Arsenic will not precipitate in the presence of TOC above a concentration of 0.1 ppm. Manganese will have active sorption in the aquifer independent of TOC concentration. The controlling function for Manganese sorption is Mn concentration as it is simulated using the Freundlich isotherm. In order to present conservative (worst-case) Mn transport, there is no active precipitation in the solute transport model to serve as a mechanism to remove Mn from solution. Additional detailed discussion of byproduct generation will be added to Section 4.2.6 of Appendix B and attenuation mechanisms will be detailed in 4.2.7 of Appendix B.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Sections 3.4.3, 5.3, and 5.4.
248	DTSC-85	Appendix B, Page 10, 4.2.6 Byproduct Generation		The section discusses generation rates for byproduct arsenic based on organic carbon dosage during hexavalent chromium reduction. Mention of the specific arsenic species and geochemical mechanisms is requested to assist with understanding stable arsenic species in both reduced waters as well as aerobic. Please also discuss how arsenic is generated naturally in aerobic, nonreducing environments and what mechanisms and species exist in those environments.	Concepts presented in the response to comment #51, HA-7 will be provided in the text for the 60% submittal. Additional details on various arsenic species in other environments outside the IRZ will also be included.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Sections 3.4.3 and 5.4.

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249	DOI-79	App. B, Section 4.2.6, 1st paragraph and Section 4.2.7, 1st paragraph, last paragraph		The assertion is made here that Mn migration will be limited outside the reactive zone where Cr (VI) is treated, and that the model-predicted attenuation profile is consistent with observed Mn attenuation across the floodplain. This concept has been often stated in discussions with PG&E consultants, i.e., that dissolved Mn is generated in the treatment zone but then will quickly adsorb outside the carbon area and dissolved concentrations will rapidly decline down gradient. However, the results of the fate and transport modeling depicted on Figures B-31 through B-34 do not seem to support this conclusion. The extent of the generated Mn plume grows continuously during the 30-year simulation period both within the floodplain and in the upland areas where carbon-amended water is injected. The plumes extend well beyond the areas where injected carbon is simulated to occur. Please reconcile these seemingly contradictory conclusions.	To introduce a level of conservatism, it is assumed that manganese sorption will occur, but manganese will not precipitate in groundwater. This will essentially retard the movement of manganese in groundwater, but will not remove manganese from groundwater. This allows the manganese to persist in the groundwater and only be minimized through dilution or remedial extraction. It is also important to note that the Mn represented in the model is also sourced from naturally occurring Mn in the rind which migrates into less reduced sediments in layers 3 and 4 and only attenuates by dilution and sorption – not via precipitation. This represents a conservative assumption that will be reconsidered in the 60% design. The rind concentrations will be reassessed and modified as necessary (refer to response to comment # 258, DTSC-91). Arsenic and manganese will be described separately in terms of attenuation and precipitation, with arsenic being more limited in overall mobility than manganese. More detail will be provided on the attenuation mechanisms for byproducts in Section 4.2.7 of Appendix B. The conceptual model, to be expanded at the beginning, of Appendix B will provide an overview of these concepts.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Sections 5.3 and 5.4.
250	DOI-80	App. B, Section 4.2.7, Item c, page 13		Item (c) says that the concentrations of sorptive forms of iron were scaled back by three orders of magnitude from the measured values in fine-grained materials. Item (d) says that iron values measured for coarse-grained materials were slightly less but of the same order of magnitude as the fine-grained. It then concludes that “These results confirm selection of the strong and weak site iron concentrations as best representations of the iron concentration and form in the aquifer soil.” DOI is not clear on which results have been confirmed and are being used; the scaled-back values or the measured values for coarse-grained materials. If the scaled-back values are used, is this being done as a conservative measure?	Item (d) will be clarified to state that difference in iron concentration between the fine and coarse fractions was about three orders of magnitude, in agreement to the assumptions in item (c).	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	No longer applicable. See updated discussion in Section 5.3.2 of Appendix B.
251	DOI-81	App. B, Section 4.2.7, Item G		Please explain this sentence: “Field isotherms matched the model isotherms when sorptive iron was scaled back by 10% - field and model isotherms were for silt/clay soil.”	Field sorption isotherms were developed by measuring the concentration of manganese in the soil and in the groundwater for samples recovered from the alluvial aquifer fine grained soil. The sorption isotherm developed from this field data matched the modeled isotherm within 10%.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 5.3.2.

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252	DTSC-86	Appendix B, Page 11, 4.2.7 Byproduct Adsorption and Precipitation	"Manganese and arsenic will sorb to iron minerals present naturally in the aquifer outside of the reactive zone, across the floodplain, and to these newly-formed iron minerals."	How then is arsenic stable at elevated concentrations in aerobic environments? Arizona wells have elevated arsenic above MCLs. Anomalously high arsenic concentrations are noted in aerobic well MW-12 coexisting with the chromium contaminant plume. Will the model allow the elevated arsenic that is measured at MW-12 and in Arizona (e.g., Sanders well) to persist in model results?	Arsenic is stable in aerobic environments due to natural geochemical equilibrium established over an extended time period, and in the presence of a continual ongoing source of arsenic (such as due to hydrothermal activity in AZ). This ongoing source over geologic time periods can result in saturation of arsenic sorption capacity in the aquifer. The text from Appendix B that this comment refers to discusses arsenic generated by the transient geochemical conditions in the IRZ. The solute transport model is designed to simulate the relative effect of arsenic generated by the biogeochemical conditions induced by the NTH IRZ, and also to simulate the fate of the arsenic naturally present in the freshwater supply well that is injected into the freshwater injection wells. The model does not include anomalously high arsenic concentrations at MW-12 or the Sanders well.	Okay		Comment resolved.	Note that as directed by DTSC on December 31, 2012, PG&E added into the 60% design, a pre-treatment system to polish Arizona groundwater to California standards prior to injection. Therefore, the fate and transport of naturally-occurring arsenic associated with freshwater injection is no longer applicable, as the freshwater source will be treated for arsenic, and has been removed from the 60% design.
253	DTSC-87	Appendix B, Page 12, 4.2.7 Byproduct Adsorption and Precipitation, Paragraph 1, Line 1.		Please cite the wells being evaluated for manganese so the reader can follow along and evaluate the assessment presented here.	The wells that were evaluated for Mn attenuation include MW-20 (adjacent to the river), MW-39, MW-30, MW-36, and MW-31 (away from the river). The concentrations of manganese and iron were evaluated in these wells under IM-3 pumping conditions. These wells will be identified in the 60% design document update to Appendix B.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 5.3.
254	DTSC-88	Appendix B, Page 12, 4.2.7 Byproduct Adsorption and Precipitation	"The field data provides a validation of the conceptual model used as the basis for attenuation in the byproduct fate and transport model."	The section must also then cite that field data also raises concern with manganese due to its long term persistence.	The long-term persistence of manganese is generally associated with persistent reducing conditions. Under less reducing conditions, manganese concentrations decline gradually with time. The field data demonstrates this. The text in the 60% design will include this expanded discussion.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 5.3.

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255	DTSC-89	Appendix B, Page 13, 4.2.7 Byproduct Adsorption and Precipitation, Item (e).		The section indicates that manganese and arsenic were added to the model at low to high concentrations to simulate conditions. It seems that actual concentrations should have been utilized. The document should include a listing of the actual concentrations used in the model to allow for review and ensure they are representative.	The naturally occurring Mn and As simulated in the model was discussed on page 15 section 4.2.8. These values were average representative values that will be refined in the 60% design.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 6.2.8, for discussion of manganese. Note that as directed by DTSC on December 31, 2012, PG&E added into the 60% design, a pre-treatment system to polish Arizona groundwater to California standards prior to injection. Therefore, the fate and transport of naturally-occurring arsenic associated with freshwater injection is no longer applicable, as the freshwater source will be treated for arsenic, and has been removed from the 60% design.
256	DTSC-90	Appendix B, Page 15, 4.2.7 Byproduct Adsorption and Precipitation	"An evaluation of the concentration trends for manganese across a transect of wells from the east (along the river) to the west (toward National Trails Highway) shows that as groundwater moves through less reducing geochemical conditions (away from the river), the concentration of manganese attenuates. The attenuation profile is simulated in the model by an analysis of manganese concentrations along a similar transect, moving from west (along the IRZ at National Trails Highway) to the east (toward the river)."	The first sentence indicates that manganese attenuates away from the river (away from less reducing conditions). The second sentence seems to say that manganese attenuation will occur towards the river. Clarification is requested.	Text will be clarified to indicate that manganese more readily attenuates in less reducing conditions. In this case, the discussion compares Mn attenuation away from the river (under IM-3 pumping conditions, where the gradient direction is reversed and Mn in the reducing zone adjacent to the river is pulled into a more oxic environment away from the river, and deeper) to the Mn attenuation simulated under IRZ conditions (where Mn generated in the IRZ migrates downgradient into a more oxic zone toward the river). This appears to be contradictory but the discussion compares current observations of Mn attenuation (under IM-3 pumping conditions) to Mn attenuation under IRZ conditions.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 5.3.

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257	DOI-82	App. B, Section 4.2.8		It appears from the discussion that the evaluation considered only naturally occurring Mn in the floodplain and not As. Please explain why the naturally occurring As component was limited only to the fresh water injection sites in the simulations. Why is As treated differently from Mn?	The mechanisms that govern arsenic mobility were analyzed in the same way in both freshwater injection wells and in IRZ injection wells. The difference lies in the predicted behavior of arsenic in these two areas, rather than the way in which they were analyzed. In the freshwater injection areas, arsenic from the freshwater supply is injected into the wells and the model predicts its attenuation with distance from the injection points. In the IRZ areas, arsenic is generated as organic carbon is consumed, and then attenuates within the organic carbon footprint via the same mechanisms that it attenuates with away from the freshwater injection wells. Any arsenic generated in the NTH IRZ is readily precipitated outside of the carbon footprint or once the carbon is consumed. The model predicts that byproduct arsenic will not reach the Colorado River or the river bank extraction wells.		Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment resolved.	Note that as directed by DTSC on December 31, 2012, PG&E added into the 60% design, a pre-treatment system to polish Arizona groundwater to California standards prior to injection. Therefore, the fate and transport of naturally-occurring arsenic associated with freshwater injection is no longer applicable, as the freshwater source will be treated for arsenic, and has been removed from the 60% design.
258	DTSC-91	Appendix B, Page 15/16, 4.2.8 Naturally occurring Manganese and Arsenic	"To simulate a naturally occurring conservative manganese concentration distribution in the rind, an additional simulation was performed under ambient (nonpumping) conditions. This assumed the rind was present in model layers 1 and 2, and extends approximately 250 ft on either side of the surface water features, as well as under the surface water features and marshland."	There appears to be no basis for utilizing the manganese rind simulation as exiting data do not support a manganese rind extending 250 feet away from the river in model layers 1 and 2. Fluvial wells nearest the river (MW-28-25, MW-28-90, MW-34-55, MW-34-80, MW-34-100, MW-52S, MW-52M, MW-52D, MW-53M, MW-54-85, MW-54-140, MW-56S, MW-56M, MW-56D, etc.) do not yield the high manganese (> 2 mg/L Mn) that is depicted adjacent to the river and under the marsh in modeling figures (e.g., Figure B-31). Figure 2-8 of the report also shows the lack of high (> 2 mg/L) manganese. Wells with elevated manganese near the river (e.g., MW-22, MW-32-035, MW-53D) are associated with highly brackish, saline (and even brine) waters atypical of site conditions. Figure 2-8 suggests that elevated manganese may be a function of depth and, therefore, related to the chemically stratified nature of the aquifer. The model must be modified to represent site conditions and the section rewritten.	Elevated concentrations of both Mn (Figure 2.8) and Fe (Figure 2.9) indicate the presence of a reducing zone extending away from the river. Anaerobic core study data suggest that although this area is generally reducing, the reducing conditions are naturally distributed with pockets of weaker and stronger reducing activity. Also, manganese content of the fluvial matrix is variable, so that in some areas that indicate reducing conditions that would support dissolved manganese(indicated by strongly negative ORP and the absence of Cr(VI)) , the observed Mn concentrations are relatively low. It is also possible that Mn concentrations are lower in parts of the shallow zone immediately adjacent to the river due to the presence of the hyporheic zone (groundwater/surface water mixing zone), which serves to deliver oxic river water that can dilute aqueous Mn concentrations and/or oxidatively precipitate Mn. A more in-depth analysis of the spatial distribution of the reducing rind, including spatial distribution of geochemical indicators, will be considered for the 60% design to more fully illustrate the extent of the reducing zone. The Mn transport model results indicate generated-byproduct Mn concentrations within the range naturally measured in the floodplain. The text will be modified in the 60% design to place this in better context with the actual background Mn concentrations observed. Additionally, a	Okay pending review of the 60% design submittal.		Comment resolved.	See Appendix B, Sections 2.3, 6.2.8, and 8.

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					one-dimensional hyporheic zone model for Mn is also being developed for the 60% design, which will be used to evaluate geochemical/hydrological processes governing manganese behavior near the groundwater-river water interface as groundwater flows toward the river.				
259	DTSC-92	Appendix B, Page 16, 4.2.8 Naturally occurring Manganese and Arsenic	"With respect to arsenic, the primary naturally occurring arsenic that was simulated was associated with the proposed freshwater injection. Groundwater extracted from HNWR-1 located in Arizona was assumed to have a naturally occurring arsenic concentration of 17 ppb. This concentration was continuously applied to all of the simulated freshwater injection wells to evaluate the potential impact of the naturally occurring arsenic."	Why was 17 ppb arsenic used for HNWR-1 when Exhibit 3-1 and Appendix A1 state a value of 15 ppb? Recommend updating this value after a robust data set is attained. Please indicate if the model, if applied in its current form, would conclude that injected arsenic would attenuate within the aquifer if reinjected back into the HNWR-1 area.	The freshwater arsenic concentration will be updated to reflect all available data for future solute transport modeling runs. The solute transport model was developed as a tool to analyze the relative impact of arsenic potentially generated by the NTH IRZ and the introduction of a freshwater water source with a known arsenic concentration into the upgradient freshwater injection wells. This solute transport model is not designed to be a tool to evaluate background arsenic behavior in the vicinity of HNWR-1. Also refer to response to comment #252 DTSC-86.	OK pending review of 60% design submittal.		Comment resolved.	Note that as directed by DTSC on December 31, 2012, PG&E added into the 60% design, a pre-treatment system to polish Arizona groundwater to California standards prior to injection. Therefore, the fate and transport of naturally-occurring arsenic associated with freshwater injection is no longer applicable, as the freshwater source will be treated for arsenic, and has been removed from the 60% design.
260	DOI-83	App. B, Sections 4.4 and Figures B-17, B-18, and B-20		The text and figures are very confusing in this section. The text appears to talk about two different optional configurations of NTH wells, one with a 150-foot spacing and one with a 75-foot spacing. The figures jump from one configuration to the other with no explanation. The figure titles speak only of the "conceptual remedy" or "remediation design locations", without distinguishing between the two apparent options discussed in the text. DOI understands from the text that PG&E is proposing the 150-foot spacing configuration design as the remediation design. The text and figures need to be revised to clearly distinguish between the remediation design and the alternative option considered but not selected. DOI recommends that Figure B-17 show the remediation design configuration of 150-foot well spacing, and that the cross section location figure (B-18) and the cross section (B-20) depict this remediation design configuration. A separate new figure can then be introduced showing the 75-foot well spacing configuration, with the title clearly stating this is as optional layout that was considered but not selected.	The text and corresponding figures will be clarified with respect to the NTH IRZ well spacing. The provisional wells will be removed from Figures B-18 and B-20. Figure B-20 will be brought to Section 3 with the provisional wells included.	OK pending review of 60% design submittal.	OK pending review of 60% design submittal.	Resolved pending review of 60% design submittal.	See Appendix B, Section 6.4, and Figures 6.4-1 to 6.4-8.

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261	DTSC-93	Appendix B, Page 17, 4.4 Remediation Design		Request adding contoured chromium plume to cross-sections (Figures B-18 through B-24). Identify the natural reductive zone on Figures B-19 and possibly B-20. Illustrate the actual screened zones that were used in the model run to allow comparison to Tables 3-1 to 3-4 and eventually to actual emplaced screen depths. What criteria will guide screen placement during drilling? Figure B-17: The flow rates associated with the IRZ wells pictured on Figure B-17 are not the same as those rates called out in Table 3-1. This difference should be discussed or corrected.	The cross-sections will be updated to reflect the chromium plume delineation and proposed screen intervals. Screen placement will be guided by the lithology encountered during drilling. Screening over the more permeable sections of the aquifer will produce better flow and encourage development of the IRZ. The IRZ well flow rates shown on Figure B-17 will be corrected to correspond to the nominal rates in Table 3-1. Flow rates will be reviewed for consistency and explanations will be included in the 60% design submittal.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B and Table 3.2-1 of the BOD Report.
262	DOI-84	App. B, Section 4.4.1		The discussion of fresh water injection wells conflicts with DOI's understanding of the different purposes of the FW-INJ wells and the UPGRAD-INJ wells. DOI understood that the FW-INJ wells receive only fresh water, while the UPGRAD-INJ wells receive both carbon-amended water and fresh water. The text of 4.4.1 identifies wells UPGRAD-INJ-3 and UPGRAD-INJ-4 as fresh water injection wells. In reviewing the design document, DOI could find no information that suggests that wells UPGRAD-INJ-3 and UPGRAD-INJ-4 would be used differently than the other UPGRAD-INJ wells.	The well names can be updated to reflect their function in the model and the text will be clarified. Because the FW-INJ well located within I-40 was no longer a viable option, it was relocated to the UPRAD-INJ-4 location. The two northernmost upgradient injection wells (UPGRAD-1 and 2) receive the water extracted from the riverbank extraction wells. The freshwater injection wells (FW-INJ-1, 2 & 4, and UPGRAD-INJ-3 & 4) receive freshwater from HNWR-1. Additional modeling can be conducted to evaluate the impact of using different patterns of freshwater and riverbank water injections into UPGRAD-INJ-1, 2, 3, & 4. Please see Exhibit 3-4 footnote c indicating that wells UPGRAD-INJ-1 and UPGRAD-INJ-2 may be used for injecting carbon-amended water or freshwater. The remaining upland wells will be used as freshwater injection wells. The proposed setup is expected to successfully create proper hydraulic conditions, so that the chromium plume moves through the treatment zone at the designed direction and rate.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittals.	Comment resolved.	See Appendix B (Section 6.4) and Section 3 of the BOD Report.
263	DOI-85	App. B, Section 4.4.1		Editorial Comment. The new section entitled "Freshwater Injection" should be included within the text between the current 4.4.1 and 4.4.2.	The text will be updated.		Okay pending review of 60% design submittals.	Comment resolved.	See Appendix B, Section 6.4.7.

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264	DTSC-94	Appendix B, Page 17, 4.4.1 National Trails Highway IRZ	"By extracting at these locations the natural west to east flow gradient is generally preserved to encourage flow through the reduced groundwater."	Extracting 200 gpm at the northern end of the IRZ would seem to have a significant effect on east-west flow. Section 3.3 indicates that pumping a remote well at Park Moabi would have adverse effects on the remedy. Please provide figures with flow lines to help visualize system flow. Please indicate why dual screen recirculation wells were no longer considered for the IRZ. They would generate no net flow along shorter segments of the NTH IRZ.	Extracting 200 gpm from the northern portion of the NTH IRZ, and 100 gpm from the central portion of the NTH IRZ allows the groundwater to flow from west to east to encourage flow through the NTH IRZ. Injection of fresh water upgradient of the IRZ, coupled with extraction from the AZ side of the river, forms the greatest flushing force through the IRZ. Switching the fresh water source to the Park Moabi area would diminish the flushing force through the IRZ, as the pull from the east would be lost and the pull from the west would lower the eastward flux of injected water to some degree. This will be explained more thoroughly in the freshwater supply evaluation technical memorandum and summarized in the 60% submittal. A more detailed discussion regarding dual-screen recirculation wells is included in the response to comment #94 (DTSC-31): As discussed in the final pilot report, the findings of the study indicated potential issues with distribution of organic carbon substrate in this recirculation design, due to vertical short circuiting between injection and extraction intervals that limited lateral distribution at the middle and deep intervals. Based on this information, the recirculation system for the final remedy does not include recirculation wells with injection and extraction intervals at the same location.	Okay pending review of tech memo and 60% design submittal.		Comment resolved.	See Appendix J of this BOD Report.

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265	DTSC-95	Appendix B, Page 19, 4.4.1 National Trails Highway IRZ	"A conservative simulated arsenic concentration of 17 ppb was introduced into all 5 freshwater injection wells. Due to the relatively high precipitation potential in this aquifer, the footprint of the impacted groundwater in the vicinity of the freshwater injection wells is fairly limited and actually reaches steady state conditions after several years where the arsenic footprint no longer expands. "	The section calls out "high precipitation potential". Please define this term. Will precipitation of the arsenic lead to well fouling? Details of the simulated arsenic precipitation model should be shared in the document. What transformations are occurring to specific arsenic species? Will pH adjustment of the freshwater be needed as originally envisioned in the 2009 CMS/FS? Angled borings/wells should be considered for this project due to logistical and cultural constraints. Angled wells for FW-INJ-3 do not appear to have been considered.	The high precipitation potential refers to the potential for arsenic to be removed from groundwater through interaction with the aquifer matrix minerals upon injection of the freshwater. This will be clarified in an update to Appendix B. Details of the arsenic precipitation model will be provided in an updated conceptual model discussion to be added to Appendix B for the 60% design. pH adjustment is not considered necessary for the freshwater injection. In the 2009 document, the need for pH adjustment was mentioned as a design consideration. Angle drilling of large diameter wells presents many serious difficulties. The drilling equipment for large diameter boreholes is not designed to drill at anything other than very slight angles off of vertical. At slight angles, the horizontal offset between the well head and the screened interval would be a few tens of feet. Other problems include difficulty in keeping a straight borehole, keeping the borehole from caving, placement of annular materials, installation of pumps and injection tubing, and rehabilitation of the well using swabs and bailers. A more complete discussion of the possible advantages and drawbacks of angle wells will be provided in the 60% design.	Okay pending review of 60% submittal.		Comment resolved.	Note that as directed by DTSC on December 31, 2012, PG&E added into the 60% design, a pre-treatment system to polish Arizona groundwater to California standards prior to injection. Therefore, the fate and transport of naturally-occurring arsenic associated with freshwater injection is no longer applicable, as the freshwater source will be treated for arsenic, and has been removed from the 60% design.
266	DOI-86	App. B, Section 4.4.2		DOI has concerns about the proposal to construct the riverbank extraction wells with capability of only extracting from the deeper portions of the aquifer. While it is understood that contaminated groundwater in the floodplain area is predominantly deep, there are areas where Cr (VI) contamination is present in samples from shallow wells east of NTH (Figure 2-3a). In DOI's view, one of the important reasons to incorporate the riverbank extraction wells in the selected remedy was to provide a "backstop" to the in-situ remedy that could be operated to capture any contaminated water that might otherwise reach the river. While it may prove to be unnecessary to extract water from the shallow zone, DOI would prefer to preserve the option of doing so without additional well installation later if it proves to be necessary. PG&E should evaluate well construction options for the riverbank extraction wells that would allow for pumping of water from the shallow intervals if deemed necessary in the future during system operation and monitoring.	While there is Cr(VI) present east of the NTH IRZ, it is anticipated that this impacted water will be readily treated in the existing shallow reducing rind. This is only applicable to existing Cr concentrations east of the NTH IRZ line, the Cr concentrations upgradient (west) of the NTH IRZ is anticipated to be treated by the NTH IRZ. The riverbank extraction wells were originally designed to be a backstop for the deep groundwater below the reducing rind. Screening wells in the reducing rind could lead to potential well fouling by the naturally occurring Mn. However, the riverbank extraction wells can be constructed in a manner that would allow them to be modified if observed conditions suggest it is necessary to control Cr6 migration. One approach would be to build the well so that the casing in the shallow unit could be perforated if water needed to be pumped from the shallow zone. Alternative designs will be considered and one selected and presented in the 60% design.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittals.	Comment resolved.	See Section 3.2, Appendix D2, and Appendix B (Section 6.4.2).

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267	DOI-87	App. B, Sections 4.4.2 and 4.4.3		This section states that reinjection of the water extracted from the riverbank extraction wells would be limited to two injections wells, presumably UPGRAD-INJ-1 and UPGRAD-INJ-2, although not specifically identified by number in the text. DOI understood that all of the UPGRAD-INJ wells would receive both carbon-amended water from the riverbank extraction wells and fresh water. In reviewing the design document, DOI could find no information that suggests that wells UPGRAD-INJ-1 and UPGRAD-INJ-2 would be used differently than the other UPGRAD-INJ wells. Why was injection of the riverbank well water limited to only these two wells in the simulations?	The text will be clarified to explain the function of the proposed wells. It is currently simulated that only the northern 2 upgradient injection wells (UPGRAD-INJ-1 & 2) will receive riverbank extraction water. The remaining two wells will receive freshwater injections. Alternative injection approaches are being considered as part of the 60% design and will be presented in the 60% document.	Okay pending review of 60% design submittal.	Okay pending review of the 60% design submittals.	Comment resolved.	See Appendix B, Section 6.4.
268	DTSC-96	Appendix B, Page 19, 4.4.2 Riverbank Extraction	"Along the west side of the Colorado River, a series of extraction wells were simulated with the goal of both accelerating groundwater through the NTH IRZ and to also capture any hexavalent chromium located downgradient of the NTH IRZ. The proposed layout of the riverbank extraction wells consists of 4 wells screened in model layers 3 and 4 (beneath the naturally occurring rind) with the option to add a fifth well if necessary. The simulated total extraction rate of 150 gpm was utilized for the solute transport model runs."	Please provide capture zone analysis, including associated figures, for the riverbank system for all layers modeled. Is the riverbank system capturing the entire plume east of the floodplain during the life of the remedy? Also document that the riverbank extractors were created to capture any generated byproducts throughout the life of the remedy. The document should discuss higher pumping rates up to 640 gpm as originally envisioned for the riverbank system in the 2009 CMS/FS. Why send imported freshwater to the inner recirculation loop when site water is available and higher rates should achieve cleanup faster? Layers 3 and 4 are proposed for pumping, presumably since they are beneath the "naturally occurring rind". The reductive zone must be clearly defined and carefully plotted on maps and cross-sections to ensure that systems are properly designed. The rind appears to be part of the remedy, yet is not properly addressed in the document. What will trigger adding a fifth well? Why was the fifth well eliminated from the original design?	Capture zone figures and an expanded discussion for the Riverbank Extraction wells will be provided with the 60% design. Pumping rates were reduced in the Riverbank Extraction wells in an attempt to reduce the impact on the naturally occurring shallow reducing rind and to minimize pumping stress on the NTH IRZ caused by higher flowrates in the floodplain. Higher pumping rates in the floodplain proximal to the NTH IRZ will lead to faster groundwater velocities between the IRZ and the Riverbank Extraction wells. This increases the hydraulic stress on the NTH IRZ in the direction of groundwater flow and increases the potential for an incomplete remedial barrier, as demonstrated in the 300 gpm model run (Figure B-46). Pumping the Riverbank Extraction wells at a reduced rate increases the potential for a comprehensive IRZ to develop along the NTH IRZ to enhance remediation of the Cr(VI) impacted groundwater. The extent of the naturally occurring reducing zone will be delineated in both plan view and cross-section in the 60% design. The fifth riverbank extraction well will be considered based on the hydraulic performance of the other 4 Riverbank Extraction wells and monitoring well data. The fifth well is not operated in the 30% design because adequate capture was achieved by just operating the other 4 extraction wells.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 6.5.

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269	DTSC-97	Appendix B, Page 19, 4.4.2 Riverbank Extraction	"These wells will potentially pull down the groundwater from the naturally occurring rind, so consideration was taken to keep the extraction rate at a reasonable level."	Clarify why pulling down shallow water with the deeper extractors should be minimized/kept to "reasonable levels".	There are two major reasons for minimizing the downward pull of the riverbank wells. 1. The naturally occurring reducing rind typically contains elevated manganese and iron concentrations that could contribute to well fouling and provide a source of manganese and iron into layers 3 and 4. 2. The naturally occurring reducing rind provides ideal conditions for Cr(VI) precipitation in the event there is breakthrough past the NTH IRZ in Layers 1 and 2. Thus the riverbank extraction wells are designed with due consideration given to minimizing potential impacts to the naturally occurring reducing rind.	Okay		Comment resolved.	
270	DTSC-98	Appendix B, Page 20, 4.4.3 Uplands Injection		Briefly describe how fouling in amended wells will be mitigated.	Wells will be periodically rehabilitated to physically or chemically remove fouling deposits on the well screen, filter pack and/ or in the near well formation. Well fouling mitigation procedures are addressed in more detail in Sections 3.2.1.1, 3.2.2.1, and 3.2.3.1 for the different components of the in-situ remediation system. In addition, proactive backwashing of the wells will be used to control fouling before it occurs.	Okay.		Comment resolved.	
271	DOI-88	App. B, Section 4.4.4		Please identify the four extraction wells and two injection wells by number in the text. DOI presumes they are Mid-EX-1 through -4 and comp-inJ-1 and comp-inJ-2, shown on Figure B-18. While this may seem obvious in this case, the previous discussions of the UPGRAD-INJ injection wells led to confusion. This can be avoided by explicitly identifying wells by number when discussing them.	Text will be clarified to reflect how the simulated wells will be operated.		Okay pending review of 60% design submittals.	Comment resolved.	See Appendix B, Section 6.4.2.
272	DOI-89	App. B, Section 4.4.5		Identify the extraction wells by number in the text. DOI presumes they are RAV-EXT-1 through RAV-EXT-4.	Text will be updated to reflect the associated well names.		Okay pending review of 60% design submittals.	Comment resolved.	See Appendix B, Section 6.4.5.
273	DOI-90	App. B, Section 4.4.6		Identify the injection wells by number in the text. DOI presumes they are comp-inJ-1 and comp-inJ-2, and FW-INJ-4.	Text will be updated to reflect the associated well names.		Okay pending review of 60% design submittals.	Comment resolved.	See Appendix B, Section 6.4.6.
274	DTSC-99	Appendix B, Page 21, 4.4.6 Topock Compressor Station Injection	"Water from the extraction wells northeast of the Compressor Station and the East Ravine Extraction wells is treated and injected into two wells located in the immediate vicinity of the TCS."	Briefly describe how extracted water is being treated prior to injection.	The water extracted from the TCS and East Ravine wells will undergo carbon substrate amendment addition prior to being re-injected. The word "treated" will be revised to "amended with carbon substrate".	Okay.		Comment resolved.	See Appendix B, Section 6.4.6.

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275	DOI-91	App. B, Section 4.5, 2nd sentence		This section states that groundwater flow under ambient conditions is primarily west to east, however, flow over much of the plume area is north to northeastward toward the river based on the contours on Figure B-25.	The sentence will be deleted.		Okay pending review of 60% design submittal	Comment resolved.	See Appendix B, Section 6.5.
276	DTSC-100	Appendix B, Page 21, 4.5 Flow Conditions		Figure B-25 illustrates simulated groundwater contours, but it is not clear which model layer is being presented. Separate figures for each model layer are required. Flow line figures are also requested for each layer.	Figure B-25 is for Layer 1. Flow figure for each layer will be provided in the 60% design report.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 6.5.
277	DOI-92	App. B, Figure B-28		Figure B-28 is missing. Figure B-27 is included twice.	Correct, Figure B-28 will be provided to show the Layer 2 simulated Cr results.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittals.	Comment resolved.	See Appendix B.
278	DTSC-101	Appendix B, Page 22, 5. Solute Transport Results 5.1 Hexavalent Chromium	"By year 30 of the simulated transport run, the majority of the hexavalent chromium plume in all four model layers has been remediated. The only exception by year 30 is the portion of the hexavalent chromium that is initialized in the bedrock in the vicinity of the East Ravine extraction wells."	The design documents should indicate what the total estimated time is to clean up (meet RAOs) based on the results of the most current model run. Modeling times should be extended until RAOs are met. The document should also mention that the "Year 30" runs for all layers do not show complete cleanup to RAOs in the alluvial aquifer.	In the 60% design, the model runs will be continued until RAOs are achieved in the alluvial aquifer. Total projected time to cleanup for the alluvial aquifer in each layer will be presented.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 7.1.
279	DOI-93	App. B, Section 5.1, 2nd sentence		There are no results shown for 5 years.	Agreed, the 5 year reference will be removed from the text.	Okay	Okay pending review of 60% design submittals.	Comment resolved.	See Appendix B, Section 7.1.
280	DOI-94	App. B, Section 5.1 and Figure B-29		It is not clear why the NTH IRZ fails to control Cr (VI) plume migration at the northern end. Please explain why the system cannot be adjusted to correct for this without having to rely on the riverbank extraction wells.	The northern end of the NTH IRZ consists of 3 extraction wells. These wells both supply the NTH IRZ injection wells and also maintain the eastward flow component towards the Colorado River. They are screened in the lowest concentration portion of the plume and hydraulically control the plume when they are actively pumping. When the IRZ "rests" for 18 months between TOC injection events, these wells are not pumping and the low concentration plume migrates a short distance past the wells. The low concentration mass that progresses past the northern NTH IRZ in model layers 3 and 4 is readily captured by the riverbank extraction well and is diluted below 32 ppb with the other riverbank extraction wells before it is injected into the upgradient wells. Model simulations will be conducted in the 60% design to analyze alternatives to better control migration of the Cr(VI) plume to the north end of the IRZ.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	See Appendix B, Sections 7.1 and 10.9.

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281	DTSC-102	Appendix B, Page 22, 5.1 Hexavalent Chromium, and Figures B-27 to B-30	The sections of the plume that are initialized on the east side of the NTH IRZ and the low hexavalent chromium concentrations in the vicinity of the NTH IRZ wells that are not treated by the NTH IRZ, are hydraulically controlled by the riverbank extraction wells.	The validity of this statement is difficult to determine based on the representative snap shots of the model provided in Figures B-27 to B-30. One might expect that the northern NTH IRZ extraction wells would be able to adequately intercept the hexavalent chromium plume, however, as demonstrated in the transport model figures, a sizable portion, albeit at low concentrations, does escape past the extraction wells towards the river and Arizona between 18 months and Year 20. Perhaps, PG&E should use particle tracking and resulting flow lines to illustrate the anticipated hydraulic movements surrounding the Northern portion of the IRZ. DTSC also recommends showing the current plume outline on these figures for reference.	Refer to response to comment #280 DOI-94. The NTH IRZ extraction wells only operate for 6 months during a two year period and are not designed to fully hydraulically control the low concentration northern Cr plume. The northernmost riverbank extraction well assists in capturing the northern tip of the Cr(VI) plume.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 7.1.
282	DTSC-103	Appendix B, 5.2 Manganese		The section or elsewhere in the document should discuss the manganese secondary MCL as well as USEPA's 2004 health advisory for manganese to provide significance to the manganese discussion. Is there an ecological risk associated with manganese? PG&E should mention some contingency measures being utilized at Hinkley to control manganese byproduct migration (i.e., pumping impacted manganese wells and injection into dry wells or infiltration gallery to precipitate manganese within vadose zone soils).	Manganese was one of 13 general chemical parameters evaluated for potential risk in the GWRA and was not identified as posing a potential ecological risk, based on data available at the time of that evaluation (ARCADIS 2009). The SMCL and USEPA's 2004 health advisory for manganese are both below the UTL of the naturally occurring concentration of 1.32 mg/L manganese in groundwater and the range of average concentrations up to 9.26 mg/L found in the floodplain. In this situation where the naturally occurring concentration is higher than a concentration protective of human health and ecological receptors, any activities conducted that maintain conditions consistent with the naturally occurring background concentration would not result in any increase in site related potential adverse impacts to either human or ecological populations Concentration is the key to evaluating potential adverse impacts to biological species. Concentration is a function of the amount of manganese present (i.e. – mass) along with the flow rate and volume of water carrying that manganese. The proposed design and associated modeling indicates that manganese generated will not increase the concentration of manganese in groundwater to exceed the UTL of background concentrations. Therefore, implementing the proposed design would not create additional adverse impact (exceeding background conditions) to species potentially contacting the manganese concentrations in groundwater. Because the proposed treatment does not increase concentrations above naturally occurring background, the proposed	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix L (O&M Manual).

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					treatment does not present a concern for additional adverse impacts for either direct contact by humans consuming groundwater, or for indirect contact by humans or ecological species contacting manganese discharged from groundwater to surface water. As suggested, a discussion of contingency measures will be included in the 60 percent design in the event that manganese concentrations exceed naturally occurring concentrations.				
283	DTSC-104	Appendix B, Page 22, 5.2 Manganese		The manganese figures and text need to be revised. See previous comment on Appendix B, 4.2.8 Naturally occurring Manganese and Arsenic, Page 15/16. DTSC does not concur with the current write up. Based on existing data presented, the section should conclude that manganese byproduct formation will occur and impact upland areas around amended injection wells as well as the majority of the floodplain with elevated concentrations for greater than 30 years. Figure 3-34 (Layer 4 Simulated Manganese Transport) suggests that the manganese plume is still expanding after 30 years. Would manganese concentrations and plume footprint continue to expand after 30 years? Include model runs that show when manganese levels return to baseline conditions.	Manganese is continuously generated in the presence of carbon. Additionally, the simulated sorption of Mn only retards the movement of Mn in the aquifer, there is no mechanism that removes Mn from groundwater in the solute transport model. In the 60% design the manganese behavior in the solute transport model will be evaluated to reflect the potential of Mn oxidation.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 5.3.3.
284	DTSC-105	Appendix B, Page 22, 5.2 Manganese, and Figures B-31 to B-34	The manganese runs take into account both the simulated naturally occurring manganese as well as potential manganese generated as a byproduct from carbon amended injection wells.	This presentation is simply confusing. Although it is PG&E's hypothesis that there would be a potential for high concentrations of manganese in the fluvial sequence, there is little objective data to support this "simulated naturally occurring manganese." If it is PG&E's intention to show the effect of Mn flux resulting from remediation, PG&E should begin with actual measured data and simulate the sequence over time as with Cr(VI). Although PG&E would also like to conclude that the remedy would not increase "the load" of manganese in the formation, it is questionable if these graphics would accomplish that either.	The simulated naturally occurring manganese distribution was meant to represent an average naturally occurring Mn distribution. Observed concentrations ranged from 1 to 9 ppm. The manganese distribution will be re-evaluated based on available site data to refine the solute transport modeling. Due to the limited data density, in particular to the east of the river, assumptions have to be made based on the observed concentration data and the operating conceptual model that explains the presence of Mn in the floodplain sediments.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 7.2.

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285	DOI-95	App. B, Sections 4.2.7, 5.3 and 6.5		Section 4.2.7 discusses arsenic attenuation and states that arsenic attenuates primarily through sorption processes. However, Sections 5.3 and 6.5 refer to arsenic precipitation in discussing the rapid As plume attenuation. In general, the discussions of Mn and As generation and attenuation must better explain why they behave similarly or differently during transport, and provide the basis for why they are being simulated differently. Also, DOI requests that the results of the As simulations be provide for the 0.5xBase precipitation simulation in map form so that the potential As plume could be assessed.	Text will be clarified to explain how arsenic and manganese are simulated. Results for the 0.5 X Base precipitation for Arsenic will be provided.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	Note that as directed by DTSC on December 31, 2012, PG&E added into the 60% design, a pre-treatment system to polish Arizona groundwater to California standards prior to injection. Therefore, the fate and transport of naturally-occurring arsenic associated with freshwater injection is no longer applicable, as the freshwater source will be treated for arsenic, and has been removed from the 60% design.
286	DTSC-106	Appendix B, Page 23, 5.3 Arsenic		See previous comments regarding arsenic. Include model runs that show when arsenic levels return to baseline conditions. As with all modeling, appropriate monitoring will need to be conducted to verify model results. Contingency measures will need to be identified in the event that modeling proves inadequate.	Additional figures will be generated to show the recovery of the arsenic levels to baseline conditions after the active remediation is completed. Contingencies will be discussed in the 60% design document.	Okay pending review of 60% design submittal.		Comment resolved.	Note that as directed by DTSC on December 31, 2012, PG&E added into the 60% design, a pre-treatment system to polish Arizona groundwater to California standards prior to injection. Therefore, the fate and transport of naturally-occurring arsenic associated with freshwater injection is no longer applicable, as the freshwater source will be treated for arsenic, and has been removed from the 60% design.
287	DTSC-107	Appendix B, Page 23, 6. Sensitivity Analysis		The rationale for conducting sensitivity analysis 10 years out should be stated. An analysis near the end of cleanup (end goal) would also seem appropriate.	The 10 year timeframe for the sensitivity analysis was selected because it provided a reasonable snapshot of the influence of the varied parameter on the plume transport. Analyzing the sensitivity at early or late times in the run potentially masks the impact of the parameter variance. Simulation results toward the end of the remedial timeframe where plume mass is still present (approximately 30 years of simulated transport) will be provided in the 60% design in order to summarize the long term impact associated with parameter variations.	Okay pending review of 60% design submittal.		Comment resolved.	See Appendix B, Section 10.

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288	DTSC-109	Appendix B, Page 25, 6.3 Riverbank Extraction Rates		A range of 0 to 300 gpm riverbank extraction rates were evaluated. Please also evaluate 640 gpm as originally proposed for Alternative E in the 2009 CMS Report.	Increasing to 640 gpm will significantly increase the byproduct impact in the uplands as can be seen in the comparison of the 150 gpm and 300 gpm runs.	Okay.		Comment resolved.	
289	Hualapai-9			In the modeling portion of the 30% design report (Appendix B), the time frame for clean-up of the Cr(VI) plume was modeled to be 30 years. Parameters for input to the remedy model came partly from the ISPTs at the Topock Compressor Station. During the different ISPT studies, carbon concentrations in the injected fluid ranged from 1,000 to 10,000 mg/L. In contrast, carbon concentrations in the remedy model ranged from 50 to 100 mg/L (many orders of magnitude lower). Therefore, the modeled results really cannot be compared to the ISPT results. The groundwater remedy, when constructed, will be a large experiment with many unknown parameters. This might be expected given the geochemical and hydrological complexities at the site. However, the Tribes and stakeholders should be made aware of the uncertainties that exist in the project, and a range of dates should be presented, rather than a promise for a 30-year completion.	A more detailed discussion of the uncertainties will be added to the text.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B, Section 11.
290	Hualapai-1 and TRC-1			<u>Addressing Uncertainty</u> The modeling discussion does not address or evaluate predictive uncertainty. The fact that the modeling report does not mention "uncertainty" suggests that an integral part of the modeling evaluation is missing here. It is important to utilize the model to address the uncertainty of model inputs (such as porosity, hydraulic conductivity, storage, river leakage, sorption, dispersion, Cr(VI) reduction rates, etc.) which could be evaluated in terms of variations in number of remediation wells, impacts from by-products, and estimated total duration of the cleanup. **TRC Recommendation:** It is anticipated that a reasonably detailed discussion of how uncertainly has been evaluated would be included in the 60% design report.	As with all mathematical models of natural systems, it is limited by factors such as scale, accuracies in estimated hydraulic properties and/or boundary conditions, and the underlying simplifications and assumptions incorporated into the models. These factors result in limitations to the model's appropriate uses and to the interpretations that may be made of simulation results. The flow model calibration procedure was explained in CH2MHILL 2005 and describes the assignment of hydrogeologic parameters. The flow model was calibrated against (a) long term average groundwater levels, (b) average monthly floodplain levels responding to fluctuating river levels, (c) short-term responses to pump testing events, and (d) plume development over time. The autocalibration program PEST was employed to refine the calibration and to reduce effects of uncertainty in each calibration target. This calibration procedure resulted in a highly heterogeneous distribution of hydraulic conductivity to represent the natural system. With respect to the solute transport model, uncertainty was addressed by conducting a detailed sensitivity analysis on various solute transport parameters. This sensitivity analyses can be utilized to address the uncertainty in the model by providing a range of remedial timeframes associated	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B, Section 11.

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					and relative impacts of by-products. Additional text can be added to the 60% design report to expand on the uncertainty associated of the predictive model.				
291	Hualapai-2 and TRC-2			Addressing Uncertainty Certainly one expects deviations between model simulated and actual system responses in drawdown, groundwater flow direction and gradient. Has the model been utilized to evaluate contingencies (aside from simply adding wells) to respond to potential changes in the system outside of those specifically shown by current model results? **TRC Recommendation:** Using a range of possible flow parameters in the model runs may illustrate potential responses in the actual groundwater system which should be monitored for during initial operation and startup. If this has already been done or is ongoing, a discussion of this analysis and results should be included in the 60% design.	The calibrated groundwater flow model provided a representative highly heterogeneous representation of the natural system. This calibration processed was described in detail in CH2MHILL 2005. Therefore, additional calibration will not be performed. Several different remedial alternatives were evaluated using the groundwater flow and solute transport model. By varying the remedial scenarios based on the amount of wells, well locations, flow rates, and well spacing, the effectiveness of the different layouts could be compared. For example, numerous runs were conducted with respect to the NTH IRZ where the system was optimized to minimize the potential for the plume to migrate past the NTH IRZ. Additional text can be added to the 60% design report to expand on the various components that were evaluated in order to arrive at the optimized remedial strategy.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B, Sections 6.4 and 10.
292	Hualapai-3			Evaluating Effects of Local-scale Geologic Heterogeneity Using the Model Local-scale geologic heterogeneity will likely dominate the effectiveness of the simulated proposed carbon injection treatment. This is typical and even expected in most groundwater cleanups, especially in fluvial systems. It does not appear that the current model incorporates the representative elementary volume (REV) to capture the local heterogeneities in confining layers, etc., especially using Mod-Flow. The model should be used to generate a range of probable cleanup times. Modeling parameter estimation tools such as PEST could be used to help estimate at least the effects of parameter uncertainty on predicted cleanup times.	The concept of REV is defined as the minimum volume over which aquifer parameters reflect their macroscopic values and do not fluctuate over small-scale changes in matrix properties (Bear, 1972). The model cells contain macroscopic average values that were originally estimated during flow model calibration (CH2M HILL 2005 and response to comment 116), and therefore support the REV concept. There is no continuous confining layer documented in the numerous well logs compiled for the site and presented in the RFI Volume 2 report, but there are heterogeneities inherent in the alluvial and fluvial materials. PEST was used in the original flow model calibration to help account for these heterogeneities. Clarifications about the modeling parameters will be provided in the 60% design. Transport parameters will be further evaluated through a sensitivity analysis to represent uncertainty in the transport model to provide a range of cleanup times in the 60% Design Report.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B, Sections 4, 10, and 11.

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293	Hualapai-4 and TRC-3			<u>Evaluating Effects of Local-scale Geologic Heterogeneity Using the Model</u> A thorough discussion is needed to address the uncertainties associated with subsurface heterogeneity and model parameterization and the associated confidence ranges for the number of wells, duration of cleanup and by-product concentrations over impacted areas. **TRC Recommendation:** It is anticipated that a reasonably detailed discussion of how uncertainly has been evaluated would be included in the 60% design report. Questions to address in refining the accuracy and precision of the model include: what are the geological, geochemical, or hydrologic heterogeneities that might be anticipated? How would these affect the design details? What are the reasonable ranges of time to achieve clean up the plume?	Heterogeneity is addressed in the groundwater flow model by a variable hydraulic conductivity distribution established during the groundwater flow model calibration process. This distribution was based on observed field data and further refined through parameter estimation (PEST). Documentation with respect to the groundwater flow model is presented in Hill 2005 and 2009. Heterogeneity is also addressed in the solute transport model by simulating the system as a dual domain model. This allows for interaction between the mobile and immobile porosities. Additional discussions regarding uncertainty will be included in the 60% design.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B, Sections 4 and 11.
294	Hualapai-5 and TRC-4			<u>Evaluating Effects of Local-scale Geologic Heterogeneity Using the Model</u> With any drawdown scenario, it is reasonable to anticipate that the system will be stressed beyond the conditions against which it has been calibrated likely causing deviations between the simulated and actual conditions. **TRC Recommendation:** In the subsequent design documents, there should be discussion on contingencies in the remedial design (other than additional wells) to account for the reasonably anticipated deviations. This may include a discussion on how <u>predicted</u> drawdown, and extent, magnitude, flow direction and/or gradient may differ from actual drawdown impacts (especially at distance from the injection/ extraction wells) using a range of possible flow parameter values.	The system has not been under the proposed stresses simulated in the model so we cannot calibrate to these proposed conditions. By calibrating to the current conditions a baseline is established to build upon. The model is just used as a tool to guide decisions, not to be used as a factual predictor. As the remedy is put in place, the system should be carefully monitored to evaluate the effectiveness.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		
295	Hualapai-11 and TRC-7			<u>Addressing Uncertainties in Model Parameters and Assumptions</u> The current flow model assumes steady-state flow conditions, and appears to assume that the seasonal water table fluctuations from such factors such as variable recharge, river leakage and variations in time and distance between gaining and losing areas are not important. **TRC Recommendation:** The model should be used to assess transient boundary conditions on the simulated predictions and model simulation runs.	While there are variations in such parameters recharge and river stage, the pattern of groundwater flow is consistent. By developing a long term steady state average condition, the model is able to take into account the fluctuations in the system	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		

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296	Hualapai-12			<u>Addressing Uncertainties in Model Parameters and Assumptions</u> A uniform model grid of 25x25 feet is specified throughout the entire sub-model domain. Given that injection and extraction well points will be on the order of one foot, corrections need to be made to the simulated heads at and near these injection/extraction wells to account for these differences. It is not clear that the current model account for this.	Focused figures were not generated to display water levels at the well points. For the purpose of solute transport modeling, the head is averaged over the entire cell to demonstrate the hydraulic influence. While water levels at the exact location of the well will vary based on injection or extraction rates, the model averages the hydraulic impact over the cell to simulate the hydraulic influence.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		
297	Hualapai-13 and TRC-8	Modeling		<u>Addressing Uncertainties in Model Parameters and Assumptions</u> Density dependent flows were not simulated, yet groundwater levels are typically corrected for both temperature and salinity (which DOES increase with depth at Topock). Would the operation and performance of the proposed remedial system (i.e. number and distribution of wells, pumping rates, etc.) be different if temperature and salinity effects were considered in the modeling? **TRC Recommendation:** Salinity differences should be accounted for in the modeling for the 60% design. At a minimum, a discussion should be included if it is anticipated that salinity variation will not be a factor, based on sensitivity calculations.	Language will be added to the 60% design explaining how temperature and salinity differences will have a negligible impact on the proposed remediation system. The flow of water will be more controlled by the natural heterogeneity of the aquifer, not the potential deviations in temperature and salinity.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B, Section 11.
298	Hualapai-14 and TRC-9			<u>Addressing Uncertainties in Number of Installed Wells</u> Discussion on page 18 of the Appendix B: “Development of a Groundwater Flow and Solute Transport Model” indicates that one of the driving forces behind the potential increase in the number of wells installed within the NTH (National Trails Highway) IRZ is based upon reducing the production of by-product: *“the spacing of the NTH IRZ wells is decreased, the carbon injection concentrations can potentially be lowered as well to reduce generated byproducts”* This statement indirectly addresses uncertainty in the system and raises concerns that additional wells will be placed prior to a thorough evaluation that additional wells will be effective. **TRC Recommendation:** A discussion of the rationale and decision points to be used to install additional NTH IRZ wells should be included in the 60% report. This discussion should include how the IRZ installation and/or monitoring data will be used in this decision process.	Text will be expanded in the 60% design to further explain the sensitivity analyses conducted to optimize the well locations, rates, and carbon concentrations. A balanced system that will optimize the Cr(VI) reduction while minimizing the potential for byproducts, and minimizing the remedial system footprint is the goal of the transport modeling.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B, Sections 6.4 and 10.

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299	Hualapai-15			<u>Addressing Uncertainties in Number of Installed Wells</u> For example, monitor well 3-D within the ISPT floodplain study indicated that chromium reduction was not efficient until carbon levels above 100 mg/L where achieved. This raises doubt about the effectiveness of lower carbon concentrations in sufficiently reducing Cr(VI). In addition, multiple examples from the ISPT data indicate that sustained chromium concentrations can persist in the presence of lower TOC concentrations. A thorough analysis of the correlations of TOC levels, achieved ORP values and Cr(VI) concentrations measured during the ISPT studies would provide insight into the range of carbon injection concentrations that are capable of reducing Cr(VI) and preventing undesirable concentrations of byproducts from forming. Prior to implementation of additional remedial wells, modeling efforts could be used to understand how additional extraction wells would impact byproducts produced in the NTH IRZ. Results from such an analysis could be used to determine appropriate byproduct action thresholds which would be used justify additional remedial wells.	This topic was discussed at the January 6 and January 19, 2012 TWG meetings. A discussion of the pilot test data will be included in a detailed response to comments in the 60% design document. Detailed discussion of the monitoring plan and how data is used will be in 60% documents.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B (Section 3.4) and Appendix L (O&M Manual).
300	Hualapai-16 and TRC-10			<u>Evaluation of the Impact of River Bank Extraction on the Organic Rind</u> In 30% Design Modeling Appendix B, sensitivity analysis of riverbank extraction wells showed that the clean-up time was not affected by riverbank extraction rates of zero. Are the riverbank extraction wells just a contingency in case Cr(VI) is detected in the Colorado River, or can the remediation proceed with zero riverbank extraction rates.*[Next four sentences appear only in the comment letter]* The potential for destruction of the organic rind would be much less if the riverbank extraction wells did not stress the groundwater system near the river. Operation of the riverbank extraction wells will certainly pull oxidized river water through the rind, which over time could reduce the ability of the rind to naturally reduce Cr(VI). In addition, Anaerobic core tests show that there is sufficient reducing capacity in the "rind" to remove a significant portion of Cr(VI) in the plume. Long-term impacts of flushing were not described **TRC Recommendation:** It may be appropriate to discuss this during a TWG meeting. A more detailed discussion of scenarios where the river bank extraction wells will (or will not) be utilized would be anticipated in the 60% design report.	The riverbank extraction wells are not a contingency in case Cr(VI) is detected in the Colorado River. Riverbank extraction wells will both facilitate the groundwater flow through the IRZ and capture Cr(VI) located in the floodplain downgradient of the NTH IRZ. The riverbank extraction wells are also designed to control NTH IRZ generated byproducts in the deeper portion of the aquifer. The riverbank wells are designed to be screened beneath the naturally occurring reducing rind to minimize potential negative hydraulic impacts on the reducing rind and reduce the potential for well fouling in the riverbank extraction wells caused by the presence of dissolved minerals in the naturally reduced groundwater in the rind. Hydraulic analyses indicate the riverbank extraction wells primarily pull water from the deep aquifer (Model Layers 3 and 4) below the river and reducing rind. Limited extracted water comes from the shallow aquifer (Model Layers 1 and 2) and the largest fraction of captured shallow groundwater comes from upgradient (west) of the riverbank extraction wells. As per comment to DTSC-96, capture zone figures and an expanded discussion for the	Comment and response noted.	Comment and response noted. Further evaluation will occur during the review of 60% design submittal.		See Appendix B, Section 6.5.

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					riverbank extraction wells will be provided in the 60% design. The naturally occurring reducing rind provides ideal conditions for Cr(VI) precipitation in the event there is breakthrough past the NTH IRZ in the shallow portion of the aquifer. Thus the riverbank extraction wells are designed with consideration given to minimizing potential impacts to the naturally occurring reducing rind.				
Appendix C – Design Criteria									
301	DOI-96	Appendix C.7		This section should identify criteria for selecting above ground versus underground piping.	The criteria will be added to this section in the 60% design submittal.		Okay pending review of 60% design submittals.	Comment resolved.	
302	DOI-97	Appendix C, Attachment A		This attachment shows general respiratory and fermentative reactions but it should also discuss 1) how substrate dose relates to lowering redox potential, causing fermentation processes that are critical to hexavalent chromium reduction, 2) how an optimal dose can achieve hexavalent chromium reduction while minimizing byproduct production (reduced manganese and arsenic), 3) arsenic reduction and increased mobility of arsenic, and 4) that the primary mechanism for hexavalent chromium reduction is abiotic reactions with ferrous iron and sulfide.	Appendix C (Attachment A) will be expanded to capture the following points: Within an IRZ, many reductive processes will be stimulated. The amount of organic carbon substrate applied to the injection points is determined by the amount needed to achieve lateral distribution. Concentrations of TOC will be highest at the injection point and decrease with distance, and the arsenic and manganese generated is a consequence of that distribution of organic carbon, as discussed in detail in Appendix G of the 2009 CMS/FS. It is agreed that abiotic pathways such as reduction by Fe(II) may be faster than direct biotic mechanisms for Cr(VI) reduction (e.g., Wielinga et al., Environmental Science and Technology, 2001). Fe reduction is expected to occur under active Cr(VI) reduction conditions, producing mixed Fe/Cr precipitates that sequester Cr(VI). Thus, we do expect that both Cr(VI) reduction mechanisms will be occurring simultaneously. To optimize the tradeoff between organic carbon distribution and byproduct generation, design parameters such as well spacing, recirculation flowrates, and injection concentrations can be varied. The first step of this process was taken with the reactive transport modeling that supported the IRZ design (Appendix B). This optimization process will continue during operation as monitoring data is collected, evaluated, and used to modify operations of the system. A monitoring plan detailing how this will be done will be included in the 60 percent design.	Okay pending review of 60% design submittal.	Okay pending review of 60% design submittal.	Comment resolved.	

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303	DTSC-110	Appendix C, Page C-2, 3rd Bullet	Non-mechanical excavating methods within TCS are mandatory and requirements will be described in more detail in the intermediate design submittal.	PG&E has asserted that this is a company policy for years and DTSC has been requesting this policy to be documented for nearly as long. DTSC does not understand why the inclusion of this policy should be deferred to the 60% design.	Comment noted.	DTSC awaits submittal of the PG&E policy.		Comment resolved.	
304	DTSC-111	Appendix C, Page C-3, C.1.4 Concrete Vaults	Vaults will be precast concrete sections conforming to PG&E Standard K-35.	What is this standard? PG&E should provide all design standards, in whole, if they are applicable to the remedy.	The draft technical specifications (part of the 60% design submittal) will list applicable standards (e.g., ASTM, ANSI, PG&E), applicable codes (e.g., Uniform Building Code, Uniform Fire Code) and other requirements. There are more than 120 specification sections and each section references one or more standards. PG&E Standard K-35 is a standard for concrete vault cover.	Okay pending review of information to be submitted in the 60% design submittal.		Comment resolved.	
305	DTSC-112	Appendix C, Page C-7, C.4.1 Piping	piping materials will be compatible with the characteristic of the conveying fluids and will be single walled unless the pipe is used to convey: (1) groundwater or remedy-produced water that is California Hazardous waste; or (2) concentrated carbon substrate. In these cases, double-walled piping will be used.	As stated earlier, because of the cultural concerns associated with the project area and the incomplete soil investigation, DTSC would prefer that double wall pipes be used for any untreated water conveyance.	Based on modeling, groundwater with Cr>5 ppm could be extracted from the IRZ extraction well, IRZ-23. Additional information about the subsurface conditions will be obtained as we start to install remediation wells. With regards to the suggested use of double walled piping for management of extracted water (<u>that are below hazardous waste characteristic level</u>) to protect against leaks due to concerns over the possibility of contamination leaching from the soils (<u>which have not been investigated</u>) to the groundwater, it should be noted that soil data do exist for the AOCs that overlap with the remedy infrastructure as shown in Figure 2-15. Supplemental soil sampling is being planned to complete the soil investigation and current schedule shows completion of the investigation prior to the start of groundwater remedy construction. Further, baseline soil samples will be collected to document baseline site conditions at the time of remedy construction. In addition, the overlapped AOCs are located within the plume footprint for which an active remediation will be implemented for decades. Additional evaluation of the potential for leaks and methods of leak detection and control will be performed and included in the 60% design.	DTSC will review evaluation of 60% design submittal.		Comment resolved.	

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306	DTSC-113	Appendix C, Page C-9, C.4.5 Secondary Containment	Where required, secondary containment systems will be sized and designed in conformance with applicable codes and standards.	When will this be defined? Since the locations of major infrastructures have already been proposed in the 30% design, PG&E should be able, at this point, to decide what components will need and where these secondary containment systems will be required.	Example elements defined with secondary containment in the 30% design submittal are: - The solid/liquid separator area (see dwgs A-7 and M-7) - The remedy produced water conditioning building containment is discussed in Appendix C, Section C.4.5 - The influent water storage tanks (see dwgs C-17 and C-18) - The truck loading/unloading area at the MW-20 bench (see dwg C-9) - The truck loading/unloading area at the Transwestern Bench (see dwg C-10) f) Carbon amendment process buildings (see dwgs C-9 and C-10) h) Carbon substrate tanks (See Section 3.2, p-3-4) Additional details will be provided in the 60% design.	Okay pending review of 60% design submittal.		Comment resolved.	See Section C.5.5 of Appendix C (Design Criteria) and Appendix D (Engineering Drawings)
307	DTSC-114	Appendix C.11 Construction Requirements		DTSC recognize that more detailed sequence will be in the 60% design, however, it would be helpful to have a general idea of the construction sequence.	An updated project schedule with more detailed sequence will be provided in the 60% design submittal.	Okay pending review of 60% design submittal.			

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308	Hualapai-36 and TRC-18			Considerations for Implementation and Construction Presently, the project site is impacted by noise from the compressor station, river traffic noise, the interstate highway (I-40) and the BNSF railway (and possibly other less significant sources). At many, but perhaps not all locations, the additional noise from groundwater contamination remedy implementation will not be problematic. However, there may be locations of cultural significance and use where this is not the case. The existing noise standards quoted in the 30% BOD Appendix C (Design Criteria), indicate, for CA facilities, that based on San Bernardino County criteria, a noise level of 70 dB is permissible. We take issue with this, as the 70 dB A-weighted equivalent energy level of 70 dB as stated in the San Bernardino County Development Code of 2007 (Section 83.01) is for an affected land use that is industrial. **TRC Recommendation:** This design criterion may be appropriate for areas such as the existing compressor station itself. However for other land uses, this criterion needs to be re-examined and likely revised downward.	PG&E appreciates the Tribe's comment and notes the TRC's recommendation. PG&E has not completed the detailed project design at this stage. In the 30% design, major process equipments were located within buildings which will attenuate process equipment sound emissions. Pumping equipments were also located in belowground concrete vaults which will attenuate the sound emissions. PG&E will continue to evaluate potential means and methods to further lower noise emissions by the remedy as the design progresses and throughout the equipment procurement process. Additional information will be provided in the 60% design, As stated in the Tribe's comment, the noise environment at the project site is currently dominated by a number of noise sources, and "at many, but perhaps not all locations, the additional noise from groundwater contamination remedy implementation will not be problematic." For other areas, PG&E does not anticipate off-site sound levels from long term remedy operation to result in a substantial permanent increase in ambient noise levels above existing noise levels (see Section 4.91.5 of the Final EIR). In fact, in some areas, a source of noise will be eliminated when the IM facilities are decommissioned and the land is restored, as part of implementing this remedy. PG&E will implement the EIR mitigation measures on noise (NOISE-1, NOISE-2, and NOISE-3) and incorporate them in the project design, construction, and operational phases. These measures include best management practices for reducing noise levels during construction and a method to inform/ communicate to alert Tribes and nearby receptors of project activities that could generate noise, and to manage/ resolve any complaints. The EIR notes that implementation of NOISE-3 would achieve the normally acceptable exterior noise standards for places of worship. The San Bernardino County Development Code 83.01.08 establishes the exterior noise standards for land uses as a place of worship at 55 dB Leq daytime and 45 dB Leq nighttime (Leq is the equivalent average hourly noise level). The noise criteria in the EIR were appropriate.	Comment and response noted.	Comment and response noted.		

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Appendix D – Plans (Engineering Drawings)									
309	DOI-98	Appendix D, Drawing G-6		There is an influent flow from the Bat Cave Wash Remedy. This is not discussed anywhere in the design package. Influent wastewater flow from the TCS and East Ravine systems is not shown. Why are solids transferred to the liquid/solid phase separators by vacuum truck? Would this process not be continuous enough to warrant dedicated piping?	The remedy produced water main that runs through Bat Cave Wash is shown on drawing G-6 (Appendix D), at the upper left hand corner. There is a parallel main that runs along National Trails Highway. A cross reference to site plans will be added in the drawings. There is no produced water pipe from the East Ravine extraction wells since those will not be backwashed automatically. The TCS injection wells (COMP-INJ-1/-2) are shown on the drawing connected to the produced water pipe. The solids loadings are anticipated to be low; therefore vacuum truck was designed for transferring solids. If actual operating conditions differ, automation could be considered.	Okay pending review of 60% design submittals.	Okay pending review of 60% design submittals.	Comment resolved.	
310	DOI-99	Appendix D, Drawing G-6A		Although small in volume (0.1 MG/yr), extraction well rehab water should be shown in the table for completeness.	This will be added to drawing G-6A in the 60% design submittal.		Okay pending review of 60% design submittals.	Comment resolved.	
311	DOI-100	Appendix D, Drawing G-9		It appears CIP water can be directly used in carbon amended injection wells. Under what conditions?	CIP water will be treated like first flush rehabilitation water. Because the characteristics of the wastewater will not be known until it is pumped back out of the well, some of this water will likely be hauled by a truck to the central treatment system initially (versus transporting through pipelines). Possible reuse scenarios will be examined after water quality is determined.		Okay pending review of 60% design submittals.	Comment resolved.	
312	DOI-101	Appendix D, Drawing -10		It appears Line 202 (third from the top of the drawing) should be North NTH IRZ Injection Leg 1 – 23.	The comment on Line 202 is duly noted. The label should read “North Nth IRZ Injection Leg 1-23”. However, it must be noted that IRZ-1, IRZ-5 and IRZ-9 and IRZ -23 are designated as extraction wells (See Figure 3-1 and Section 3.2.1) and will not be used to inject carbon-amended water into the aquifer.		Okay pending review of 60% design submittals.	Comment resolved.	
313	DOI-102	Appendix D, Drawing C-4		Injection wells should be shown on the drawing (the symbol is in the legend).	The change will be made in the 60% design.		Okay pending review of 60% design submittals.	Comment resolved.	
314	DOI-103	Appendix D, Drawings C-25 and 26		The pipeline profiles are missing on the drawings.	The profiles will be shown in the 60% design submittal.		Okay pending review of 60% design submittals.	Comment resolved.	
315	DOI-104	Appendix D, Drawings I-5, I-10-, I-13, and I-15		DOI reviewed the fresh water system P&ID (Drawing I-5), which showed freshwater output going to facilities on Drawings I-10, I-13, and I-15. Drawings I-10 and I-14 identified no inflow from Drawing I-5, but I-13 did. One of these lines should go to the freshwater injection P&ID, which does not exists.	These drawings will be clarified in the 60% design submittal.		Okay pending review of 60% design submittals.	Comment resolved.	

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316	DOI-105	Appendix D, Drawing M-11A		Where is the influent line? Also, please explain the notation "future borehole dia after re-drill". Is the drawing depicting potential future well diameters as wells are periodically replaced in the same location?	The influent line is shown in the center of the diagram (the backwash and injection share a common line that join together outside the well casing). For clarity, a call out will be added in the 60% design submittal. The wells will be drilled in two passes because of the size and depth of the boring – 1) a pilot hole to record the lithology and perform geophysics; 2) reaming the boring to place the casing and filter/gravel pack.		Okay pending review of 60% design submittals.	Comment resolved.	
317	DOI-106	Appendix D, Drawing M-13A		According to Table 3-1, all single screened wells are for layer 1, and dual screened wells are for layers 1 and 3. Why is packer shown above layer 1 for the single screen well but not the dual screen well?	For the single screen injection wells, the packer is used to help support and centralize the down-well piping and appurtenances. In the dual screen wells, the primary purpose of the packer is to isolate the two target zones of the aquifer (while providing the support and centralization as a secondary purpose). Standardization of the packer equipment simplifies the spare parts inventory.		Okay.	Comment resolved.	
318	DOI-107	Appendix D, Drawing M-13D		Has this sheet been put in as a place holder to be completed in the 60% design? Please explain.	That is correct. Details will be added in the 60% design package.		Okay pending review of 60% design submittals.	Comment resolved.	
Appendix F – Remedy-produced Water Management Technical Memorandum and Response to Comments									
319	DTSC-115	Appendix F, Remedy Produced Water Management		Can PG&E define the rehabilitation event – In a common rehabilitation event – you have acid washing then swabbing and jetting. Do you anticipate equipment replacement? What is the respective down time of that well?	Over time, wells will exhibit a progressive loss in specific injectivity and specific capacity. If routine backwashing does not correct the decline or loss, more extensive or aggressive rehabilitation will be required. A common rehabilitation event consists of first, using various tools and techniques to agitate the well to remove and loosen the plugging material, such as wire brushing, swabbing, surging and the use of acids/chemicals and second, removing the plugging material from the well by airlifting or pumping. In addition, testing can also be conducted before and after a rehabilitation event to identify the zones that are most plugged (before the event) and to understand the effectiveness of the rehabilitation (after the event). Testing techniques could include video surveys, spinner surveys, and aquifer tests. At the start of a rehabilitation event, the equipment (pump, connecting pipe) will be removed from the well and will be replaced if significant wear or corrosion is noted; otherwise, equipment will be replaced based on a replacement schedule developed in the O&M plan. A well could be out of service for 1 to 2 weeks during a rehabilitation event. Down time is usually dependent on the ease of access to the well, the ability to efficiently manage	Okay pending review of the 60% design and O&M Plan submittal.		Comment resolved.	See Appendix F of this BOD Report.

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					produced water, the well depth and diameter, the amount of pre and post testing that is required, the severity of capacity loss or plugging, and the number of rehabilitation techniques utilized during the event.				
320	Hualapai-37	Appendix F		1. Evaluate how the remedy-produced water management system will perform in relation to how much time the remediation process will take; i.e. 30 years – 60 years. Appendix F provides a list of options for disposing of the remedy-produced water, and no definitive water management alternatives were presented. Given the uncertainties, it is difficult to describe the anticipated performance of the remedy-produced water management system. Infrastructure such as pipelines, pumps, and valves would be expected to wear out, and these components would be replaced as part of routine maintenance. However, the expected life of the injection and IRZ wells cannot be predicted over the 30 to 60 years of the remediation project. It is possible that re-injection of unclean water (i.e. remedy-produced water that has not been fully treated or cleaned) might reduce the overall life of the wells, requiring the drilling of replacement wells, thereby prolonging the time period necessary to complete the groundwater remediation.	Appendix F presents a management plan that is flexible to support, and not constrain the remedy over the anticipated multiple decades of operation. Having more than one reuse and/or disposal option available is critical for this remedy over the long haul. The design basis for the remedy produced water conditioning system is 30 years. A Draft O&M manual will be included in the 60% submittal with information about routine maintenance activities, sampling, testing, equipment replacement schedule, etc. for the conditioning system as well as maintenance activities for wells (backwash, well rehab). Injection well performance will be monitored (e.g., specific injectivity) and evaluated, and well maintenance will be performed in a timely manner to prevent reduced well life	Comment and response noted.	Comment and response noted pending review of the 60% design, including the groundwater monitoring and contingency plans.		See Appendix F and the draft O&M Manual of this BOD Report.

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321	Hualapai-38	Appendix F		<u>2. Are the stated estimates for required conditioned water (7.3 MG per year referenced on Table F1) viable for the remediation remedy? According to the document (page F-2) "a variable that will have a significant impact on the volumes produced is the frequency of backwash events…" Please review data for reliability. What are the consequences of increased backwashing to the existing water tables with a projected run-time of 30 to 60 years?</u> The estimated annual volume of remedy produced water is shown to be 7.3 million gallons per year (Mgal/yr). This translates to about 22.4 acre-feet per year (af/yr). There is a significant amount of uncertainty in the number of IRZ wells and frequency of backwash and well-rehabilitation events; therefore, it seems that the design should consider a range of values. In any case, 22.4 af/yr is a significant amount of water, considering that the groundwater flow model (CH2M HILL, 2005) indicates that 10 af/yr of groundwater flows into the west side of the model domain, the subsurface outflow from the Mohave Basin is 5 af/yr, and Mohave Basin discharge to the Colorado River is 603 af/yr. If the remedy-produced water were removed from the Mohave Basin water budget (for example, on page F-9 by trucking off-site or evaporation through TCS ponds), the loss of water to the aquifer would represent a substantial loss of the water budget. Accordingly, PG&E should ensure that every measure is exercised to minimize this water loss.	The groundwater levels at the Topock site are controlled by the Colorado river. The quantity of water being discussed as remedy produced water is insignificant in comparison to the water available from the Colorado River. The average annual flow of the river below David Dam is nearly 10 million af/yr. The river is in communication with the aquifer at Topock. If the aquifer were drawn down below the level of the river, recharge from the river would rapidly replenish the aquifer. Note that PG&E currently pumps over 200 af/yr from the IM-3 wells on the river bank just to maintain a minimum landward gradient. The aquifer reaches steady state within a matter of hours to days when IM-3 pumping is started or stopped. Even though the volume of water generated by well maintenance is insignificant in terms of the basin-wide water balance, it is PG&E's desire to minimize the volume of water trucked away or discharged to the evaporation ponds.	Comment and response noted. DTSC agrees that water is a valuable resource and should be preserved within the local water basin to the maximum extent possible.	Comment and response noted pending review of the 60% design, including the groundwater monitoring and contingency plans.		See Appendix F of this BOD Report and the draft O&M Manual, Volume 2, Sampling and Monitoring Plan and Volume 3, Contingency Plan.
322	Hualapai-39	Appendix F		<u>3. Please evaluate backwash byproducts as they relate to remedy-produced water (conditioning) that is possibly reused by blending it with carbon-amended water and then injecting back into carbon-amended IRZ wells as described on page F-13.</u> The document indicates that the backwash water will have elevated concentrations of Cr(VI) and byproducts (As, Fe, and Mn). It is further indicated that the well-rehabilitation water will have pH values potentially less than 2. It is proposed that this remedy water will be re-injected into IRZ wells after pH neutralization and filtration of solids. However, there does not appear to be a contingency plan addressing the potential for handling remedy-produced water that could contain high concentrations of contaminants. Approaches outlined in Appendix F assume that the remedy-produced water will be non-hazardous and can be re-cycled.	Please note that the text that this comment refers states that the wells, receiving the injected water, will have elevated levels of byproducts, carbon, and <u>possibly</u> chromium. Injection wells need similar water to the formation water to not cause adverse geochemical reaction. Therefore, pH adjustment of water generated during acid treatments is anticipated to be required. Removal of dissolved constituents (byproducts and low levels of chromium) will not be needed because after blending backwash water with the water from the riverbank wells, the injected water quality will be similar to the aquifer water quality in/near the injection wells. Injection well performance will be monitored (e.g., specific injectivity) and evaluated, and well maintenance will be performed in a timely manner to prevent reduced well life. Based on experience at Topock and Hinkley, PG&E anticipates that the routine backwash water will be non-hazardous. This will be verified and confirmed via monitoring at startup and during operations.	Comment and response noted.	Comment and response noted pending review of the 60% design, including the groundwater monitoring and contingency plans.		See Appendix F of this BOD Report and the draft O&M Manual, Volume 2, Sampling and Monitoring Plan and Volume 3, Contingency Plan.

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					Well rehab water can be thought of as having two distinct water quality characteristics – one at the beginning (first flush) and the other at the end of the rehabilitation process. The first flush water can be low in pH (acid is used to dissolve mineral deposits), and contain high concentrations of solid materials and rehabilitation chemicals. As the flushing continues, the water quality becomes more similar to backwash water. By careful management of the acidification process, it is possible to maintain pH >2 in the first flush water so that no hazardous waste is expected to be generated. Note that the preference for disposal of first flush rehab water are the TCS evaporation ponds or off-site disposal (trucking offsite to permitted disposal facility is an approach presented in Appendix F). However, monitoring of water quality will be conducted during rehabilitation events. Care will be taken to maximize recycling/reusing of produced water onsite and minimize the amount of water needed to be trucked offsite.				
				In addition, re-use by blending with carbon-amended water could consume carbon that is intended for remediation of the Cr(VI) due to the presence of byproducts such as ferrous iron and sulfide; therefore, target carbon concentrations might not be achieved in the remedial system.	Ferrous iron in the injected water will not consume the amount of organic carbon needed for the remediation of Cr(VI), in fact it is a product of the carbon injection. Carbon would be consumed by oxidized species, not by reduced species such as ferrous iron and sulfide. As discussed in response to comment #51 HA-7, the combination of iron reduction and organic carbon oxidation that produce the reducing conditions in the IRZ for remediation of Cr(VI) will occur thermodynamically as follows: $Fe(OH)_3(s) + 3H^+ + e^- \rightarrow Fe^{2+} + 3H_2O$ $1/12\ C_2H_6O + 1/4\ H_2O \rightarrow 1/6\ CO_2 + H^+ + e^-$ where C_2H_6O is ethanol, the form of organic carbon to be injected in the IRZ.				
				As with any engineering design, the remedy-produced water treatment system should be designed for the worst-case scenario.	It is not clear as to "the worst case scenario" mentioned in this comment. It is typical that groundwater remediation systems are designed to anticipated conditions and, through the use of contingency planning, provided with adequate flexibility for adjustment after startup and operations.				
				At the top of page F-15, "if strict water quality requirements are mandated for re-injection options, removal of dissolved constituents (such as arsenic, manganese, iron, calcium and	See 1st paragraph of this response.				

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				selenium) may be required." Note that Cr(VI) is not mentioned in this list of constituents. As described above, re-injection of unclean water (i.e. remedy-produced water that has not been fully treated or cleaned) might reduce the overall life of the wells, requiring the drilling of replacement wells.					
323	Hualapai-40	Appendix F		<u>4. If Cr(VI) is not effectively removed from the aquifer, what is the contingency plan if the backwash contains high concentrations of Cr(VI)?</u> If the backwash contains Cr(VI), Appendix F proposes to add carbon (ethanol) to the backwash water before re-injection, which will supposedly reduce Cr(VI) to Cr(III) after re-injection. However, with an automated backwash and re-injection system (as proposed), it is not clear whether there would be monitoring of Cr(VI) concentrations in backwash water. A contingency plan was not presented for treatment of backwash water containing Cr(VI) concentrations.	Backwash water quality will be monitored; the draft O&M Manual will propose a monitoring frequency. As indicated in response to comment #321 Hualapai-39, removal or treatment of dissolved constituents (including Cr(VI)) in the injected water will not be required because after blending with water from the river bank wells, the injected water quality will be similar to the aquifer water quality in/near the injection wells. Because the water is being injected along with carbon amendment in to an already reduced geochemical environment around the injection wells, any Cr(VI) in the injected water will be rapidly reduced within a short distance of the injection well. Injection well performance will be monitored (e.g., specific injectivity) and evaluated, and well maintenance will be performed in a timely manner to prevent reduced well life.	Comment and response noted. DTSC agrees that the pending contingency plan is an important document that will require careful evaluation.	Comment and response noted pending review of the 60% design, including the groundwater monitoring and contingency plans.		See Appendix F of this BOD Report and the draft O&M Manual, Volume 2, Sampling and Monitoring Plan and Volume 3, Contingency Plan.

Notes:

* Comment number is denoted by commenter name (or abbreviation, see below) followed by the order of the comments received.

** This column indicates where changes as a result of comment resolution, if applicable, are reflected in the design documents. The design documents include the 60% BOD Report, the Engineering Drawings/Plans (Appendix D of the BOD), and the draft O&M Manual (Appendix L of the BOD).

DOI = U.S. Department of the Interior
DTSC = California Department of Substances Control
Hualapai = Hualapai Department of Cultural Resources
HA = Hargis + Associates, Inc. (on behalf of Fort Mojave Indian Tribe)
MWD = Metropolitan Water District
TRC = Technical Review Committee.