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From: Aaron Yue [mailto:ayue@dtsc.ca.gov]
Sent: Friday, June 17, 2011 5:36 PM
To: Hong, Christina/LAC; YJM1@pge.com
Cc: Courtney Ann Coyle, Attorney for FMIT; Arlene Kingery, Fort Yuma Quechan Indian Tribe; Janis Lutrick, ARCADIS; Lisa Kellogg, Arcadis; Marshall Cheung, Twenty Nine Palms; William Anderson, Twenty-Nine Palms; Danielle Taber, ADEQ; Julie Riemenschneider, ADEQ; Sybil Smith, ADEQ; Thomas Di Domizio, ADEQ; cwolff@blm.gov; George Shannon, BLM; Michael Johnson, BLM; Mike_Henderson@blm.gov; Ramone McCoy, BLM; bob.lucas@calobby.com; Steve Bigley, CBWD (e-mail only, not on CWG); Schroth, Brian/SAC; Burton, Frankie/BAO; Vogt, Gerald/RDD; Piper, Jay/LAS; Eakins, Julie/BAO; Piper, Jay/LAS; Sheets, Keith/BAO; Barackman, Martin/RDD; Cavaliere, Mike/BAO; Lee, Serena/SDO; Jack Ehrhardt, Hulapai Indian Tribe; Patty@co.mohave.az.us; Rachel Patterson, Mohave Co DPH; Sherry Cordova, Cocopah Indian Tribe; Jill McCormick, Cocopah; Edmund Domingues, Cocopah; Paul Soto, Cocopah; Dennis Smith, HSG; Rick Newill, BOR; jcchen@crb.ca.gov; Lindia Liu, CRB; Richard Armstrong, CRITs; Douglas Bonamici, CRITs; Eric Shepard, Colorado Indian Tribe; Charley Land, CRIT Env. Prot. Off.; Michael Sullivan, FMIT Rep; Stefan Awender, DFG; Aaron Yue; Christina Fu; Christopher Guerre; Greg Neal; James Eichelberger; Jose Marcos; Karen Baker; Lori Hare; Mona Bontty; Nancy Bothwell; Shukla Roy-Semmen; Yolanda Garza; kabei.arlene@epa.gov; kaplan.mitch@epa.gov; Steve Armann, US EPA; Christine Medley, FMIT; Linda Otero, Fort Mohave; Luke Johnson, FMIT; Nora McDowell-Antone, FMIT; Timothy Williams, Chairman, FMIT; Win Wright, Hualapai; Loretta Jackson, Hualapai Tribe; Shan Lewis, Fort Mohave; Carrie Marr, USFWS; Jean Calhoun, USFWS; Linda L. Miller, USFWS; eric_fordham@geopentech.com; john_barneich@geopentech.com; tom_freeman@geopentech.com; Dawn Hubbs, Hualapai; Leo S. Leonhart, Hargis & Associates; Christine Herndon, HSG; Toni Sekunda, HSG; William Hirt, Quechan Indian Tribe, Ft. Yuma; Carrie Cannon, Hualapai; LTJG Isabel Espinosa; Vincent Slayton-Garcia, IHS; Pamela Innis, USDOI; drew@jdp-law.com; Mark Slaughter, BOR; Bart Koch, MWD; Mickey Chaudhuri, MWD; Stewart, Mic/EXT; Peter von Haam, MWD; sliang@mwdh2o.com; tfreeman@mwdh2o.com; Dwight A. Dutschke, Office of Historic Preservation; Curt Russell, PG&E; Glenn Caruso, PG&E; Juan Jayo, PG&E; Kevin Sullivan, Contract Engineer (for PG&E); rldl@pge.com; David Harper, CRIT; Dave Fogerson, SDCWA; Casey Padgett, DOI; Melissa Derwart, US DOI; Steve McDonald; Michael Anderson, SUMMIT Tech. Res., Inc.; Brad Guay, Havasu NWR; Jeff Smith; Valerie Thomas, USBOR; Jose Cortez, CRWQCB; Tom Vandenberg, SWRCB; Charles Wood, Chairman, Chemehuevi Tribe; Dennis Fagundes, Chemehuevi; Gilbert Parra, Chemehuevi Tribe; Eddie Williams, Fort Yuma-Quechan Tribe; Amanda Barrera, CRIT; Shirley Smith, Chemehuevi Tribe

Subject: PG&E: Comments on the May 2011 Groundwater CMI/RD Work Plan for SWMU 1/AOC 1 and AOC 10

Dear Ms. Meeks:

The Department of Toxic Substances Control (DTSC) has completed the review of the Groundwater Corrective Measure Implementation/Remedial Design Work Plan for SWMU1/AOC1 and AOC10 at PG&E Topock Compressor Station, Needles, California (CMI/RD Work Plan) dated May 2, 2011. Attached you will find our tabulated comments for your response. Furthermore, DTSC has also received comments from several stakeholders during our comment period which ended on June 10, 2011.

Their comments, including Arizona Department of Environmental Quality, Fort Mojave Indian Tribe, Hualapai Indian Tribe, and MWD of Southern California, are attached for your review and response as well.

DTSC also notes that the Department of Interior has separately transmitted their comments to you this morning. For completeness, DTSC has also included their comments in this transmission.

If you have any questions regarding our comments or the stakeholders' comments, please feel free to contact me.

Sincerely,

Aaron Yue
Senior Hazardous Substances Engineer
Office of Geology
Cypress, California

Comment Number	Location in CMI/ RD Work Plan	Reference Text	Comment
1.	General Comment		**In reviewing the content of the May 2011 CMI/RD Work Plan, DTSC is concerned that PG&E has deferred the submission of a significant amount of information until future design submittals (see Exhibit 1-3). Although DTSC agrees that some of the consent agreement requirements can only be fully satisfied after thorough review of the design proposal (e.g. site safety and security provisions), deferral of the identification and acceptance of critical design criteria may have significant schedule impacts associated with future design submissions. It is critical for PG&E to begin and commit to key elements of the design upfront. DTSC, believes that PG&E should have, at this point, conducted a thorough review and defined the design criteria and basis for each of the critical components of the remedy stated in section 1.2.1 For example, PG&E should have conducted an analysis to provide the design criteria associated with**

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			fresh water extraction locations: What criteria or limitations would be used for the decision to accept or reject an extraction location (permit, cultural impacts, land owner agreements/ acceptance, hydro-geologic limitations, conveyance issues, etc.) What design basis would bind these criteria (i.e., pressure, mass, weight, flow rate, water conditions/ chemistry, etc.)? It is only after such analyses of each key remedy components would PG&E be able to properly formulate a realistic schedule for the design and implementation of the remedy. DTSC believes that the CMI/RD work plan will need significant revision to obtain up front "buy-in" of the evaluation to be conducted for the 30% design.
2.	General Comment		**The May 2011 CMI/RD Work Plan did not include specific design criteria and design basis. As written, DTSC is concerned that elevation in concentrations of various substances as a result of the remedy would be unnoticed unless a proper baseline is established. The work plan should**

Comment Number	Location in CMI/ RD Work Plan	Reference Text	Comment
			establish localized baseline data of various substances of concern prior to implementing the remedy for monitoring the performance of the remedy as well as determining compliance with the RAOs.
3.	General Comment		**Please note that because the CMI/RD Workplan presents the big picture framework and schedule for implementation of the selected groundwater remedy and the level of project definition will increase during the design process leading to the final design. When PG&E proposes the final design with a discrete footprint within the project area, DTSC shall determine if the impacts associated with the final design are generally consistent with the significance conclusions of the Final EIR, after implementation of mitigation. On this basis, DTSC shall determine whether the specific design for the final remedy is within the scope of the program EIR or if additional environmental review is needed.**
4.	Page III, Certification		**Need PE stamp for certification**
5.	Page 1-1, Introduction, Last Paragraph	"This work plan describes the framework for activities to be conducted through design, construction, startup, operation, maintenance,	**Revise the work plan to eliminate the use of the RCRA terms "closure" and "post-closure".**

Comment Number	Location in CMI/ RD Work Plan	Reference Text	Comment
		monitoring, closure, and post-closure of the groundwater remedy."	**Replace with terms acknowledging remedy decommissioning and long term monitoring respectively.**
6.	Page 1-2, Project Background		**PG&E should include a reasonable overview discussion on the cultural significance of the Compressor Station area to the Native American tribes.**
7.	Page 1-2, Project Background, Second Paragraph	"Investigative and remedial activities at the Compressor Station date back to the 1980s with the identification of SWMUs through a RCRA Facility Assessment (RFA)."	**Prefer to say "began in the 1980s". Not all AOCs and SWMUs were identified through the RFA. Note that additional information on potential historical waste management activities were released by PG&E as recent as 2010.**
8.	Page 1-2, Project Background, Second Paragraph	"To date, major portions of the site RCRA Facility Investigation/Remedial Investigation (RFI/RI) have been completed…"	**This is only true for groundwater. Soil Investigation is just in the RFI/RI work plan stage. This sentence needs to be revised as follows. "To date, major portions of the site RCRA Facility Investigation/Remedial Investigation (RFI/RI) have been completed for groundwater,…"**
9.	Page 1-2, Project Background, Second Paragraph	"…an Interim Measure (IM) is being implemented,…"	**Insert "... to stabilize chromium plume migration towards the river ,..." after implemented.**
10.	Exhibit 1-1 and Exhibit 4-1	Interim Measures, CEQA EIR, Achieve RAOs and Closure, Post-closure Monitoring boxes	**IM is not an assessment process. CEQA EIR is not a decision process, but an assessment of**

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			impacts. Remove word "Closure" in completion boxes because of RCRA specific implications. Use "post remediation monitoring" and "Achieve RAOs"
11.	Page 1-4, Remedy Decision, Second Paragraph	"The decision process steps identified on Exhibit 1-1 include the California Environmental Quality Act (CEQA) EIR, the RCRA SOB, the CERCLA Proposed Plan (PP), and the CERCLA ROD."	**Modify this sentence and remove "the California Environmental Quality Act (CEQA) EIR". EIR is an assessment document for the final decision. Project approval is based on the Findings of Fact, Statement of Overriding Considerations and the signing of the Resolution of Approval.**
12.	Page 1-4, Remedy Decision, Second Paragraph	"The SOB, which identified the State's preferred alternative, was published by the DTSC in January 2011 (DTSC, 2011a)."	**The draft SOB, was published by DTSC in June 2010 and finalized as part of the Staff Report supporting the Resolution of Approval that was signed in January 2011. The section should be revised to incorporate this information.**
13.	Page 1-4, Remedy Decision, Third Paragraph	"The purpose of the IM has been to stabilize the groundwater contamination during the time period in which the site characterization, risk assessment, and alternative definition and evaluation steps are completed."	**Insert "groundwater" into the cited sentence prior to "site characterization".**
14.	Page 1-4, Last Paragraph	"Following attainment of the RAOs, closure and post-closure activities will take place."	**Change to: Following attainment of the RAOs, long term monitoring and remedy decommissioning and reclamation activities will take place.**

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15.	Page 1-5, Section 1.2.1	Components of the groundwater remedy	**The groundwater remedy, in accordance with the December 2009 CMS/FS, Section 3.3.3, also requires the monitoring of selenium, nitrate and molybdenum through out the operation and maintenance phase of the remedy. This requirement should be added to the bulleted list.** **Furthermore, the EIR remedy description, also includes "monitoring of the chemical parameters and hydraulic properties of groundwater at the site." Therefore, groundwater monitoring for the effectiveness of the remedy should also be added to the list.**
16.	Page 1-5, Section 1.2.1	"Monitored natural attenuation (MNA) as a long-term component to address residual Cr(VI) that may remain in recalcitrant portions of the aquifer after in-situ treatment."	**Modify the cited sentence to read as follows: Monitored natural attenuation (MNA) as a long-term component to address residual chromium that may remain in recalcitrant portions of the aquifer after enhanced in-situ treatment and optimized system performance.**
17.	Page 1-5, Last Paragraph and Exhibit 1-2	"The level of project definition will increase during the remedial design phase and will continue to increase during the	**The project definition should not change beyond the remedy design phase. The concept of increasing**

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		construction and operation and maintenance phases."	**project definition is for cost estimate accuracy (evident by cited reference USEPA, 2000) and not to be confused with remedy implementation. Revision is requested.**
18.	Page 1-6, Section 1.2.2	"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])."	**Although this is clearly a stated RAO from the CMS/FS and carried into the remedy, stakeholders have been concerned that the remedy would allow discharge of chromium into the Colorado River. DTSC's intent has always been to maintain the quality of the river water and not to allow the degradation of it to the water quality standard of 11 ug/L of Cr(VI). The Work Plan should clarify that the design criteria is to avoid exceeding the baseline conditions (nondetect to trace levels) while the project is implemented.**
19.	Page 1-7, ARARs, First Paragraph	"Plans and procedures to comply with the identified location- and action-specific ARARs during construction, operation, monitoring, closure, and post-closure phases of the groundwater remedy will be developed, as discussed in Chapter 4."	**Please remove the terms closure and post-closure as it pertains to the groundwater remedy. Unless the unit under cleanup was authorized as a waste management unit under a permit, interim status or listed under a RCRA Part A application, "closure" requirements do not apply. Nevertheless, it is**

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			subject to RCRA Corrective Action.
20.	Page 2-1, Section 2.1 and Exhibit 2-1		**The list of remedy components should be revised to address related comments cited for Section 1. See Comments above.**
21.	Page 2-1, Second Paragraph of Section 2.1	"The level of project definition will increase during the remedial design phase and will continue to increase during the construction and operation and maintenance phases."	**See comment above regarding the inappropriate use of cost estimate guidance concept for project definition.**
22.	Page 2-1, Second Paragraph of Section 2.1	"It is fully expected that changes to the numbers, locations, methods, and configuration of remedy components will change as the remedy moves through the design, construction, and operational phases."	**Please clarify what is meant by change in "methods" during design, construction, and operational phases? The sentence following the referenced text is clear on anticipated changes to optimize the system. Is this sentence redundant?**
23.	Page 2-1, Section 2.1		**PG&E should establish short term RAOs to gauge the progress of the remedy as part of the five year review. This is done routinely at clean-up sites. Example can be expected outcome of floodplain IRZ chromium concentrations and by-product concentrations at monitoring or extraction points within five years. This concept should be part of the CMI/RD Work Plan.**
24.	Page 2-2, Section 2.1.1,	"Effective distribution of organic carbon	**How will PG&E measure this "key**

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	Third Paragraph	(as measured by total organic carbon [TOC]) is one of the key design criteria for the establishment of the IRZ."	**criteria"? Would additional pilot tests need to be conducted beyond the modeling and/or enhanced monitoring? PG&E has not provided necessary schedule to complete these evaluations in Chapter 6.**
25.	Page 2-2, Section 2.1.1, Fifth Paragraph	"Solute transport modeling will support the design of the IRZ. The model will establish the number of IRZ wells, the spacing between those wells, injection flow rates, carbon dose rates, as well as the location and flow rates of extraction wells within the line of IRZ wells. The plan for developing the model and modeling efforts is discussed in Section 6.2."	**The Work Plan should also state that the model will also assist in locating monitoring wells associated with the IRZ and preparing an adequate groundwater monitoring and reporting program.**
26.	Page 2-3, IRZ System Footprint, First Paragraph	"Wells will be installed on one or both sides of the road (possibly extending into the floodplain or areas adjacent to natural gas pipeline corridors northeast of the Topock Compressor Station)."	**The location of the pipeline corridors mentioned should be included in a figure for clarity.**
27.	Page 2-3, IRZ System Footprint, Second Paragraph	"These structures could be located at the MW-20 Bench as this area is easily accessible and is next to the IRZ, minimizing the required distance for piping to and from the extraction and injection wells and operational logistics."	**If PG&E intends to construct facilities on MW-20 bench and may need Department of Interior approval, a list of anticipated key approvals should be considered in the CMI/RD Work Plan as part of the project schedule (see expected submissions in Table 4-1 and 4-2).**
28.	Page 2-3, IRZ System Footprint, Second Paragraph		**In this section, PG&E describes the remedial system in concept, but it is difficult for readers to visualize what the system may look like.**

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			Perhaps it would be beneficial for PG&E to show photos of the Hinkley control buildings and associated tank as real life examples of the type of structures that may be used at Topock.
29.	Page 2-3, IRZ System Details, Third Paragraph	"The IRZ wells can be designed with one to three discrete screen intervals targeting specific zones of the water-bearing unit for treatment by the IRZ."	**The rationale for the number of discrete screens should be discussed. Modeling results should be utilized to assist in IRZ well design.**
30.	Page 2-3, IRZ System Details, Fifth bullet	"Equipment to facilitate batch addition of well maintenance compounds at the well head"	**What are the anticipated compounds, and the type of equipment necessary at the well head?**
31.	Page 2-4, Well Maintenance, Fifth Paragraph	To maintain the performance of the injection wells, the IRZ will be equipped with facilities to provide routine and preventive in-well maintenance, including backflushing pumps, and chemical addition access piping.	**The anticipated type of chemicals to be utilized for well maintenance should be mentioned in the Work Plan.**
32.	Page 2-5, Section 2.1.2	"Extraction downgradient of the IRZ line will serve the purpose of capturing Cr(VI) that was already downgradient of the IRZ line prior to IRZ operation. It will also help draw the chromium plume through the IRZ and draw carbon-amended water from the IRZ line into the floodplain to expand the extent of treatment in the floodplain."	**In order to facilitate all the goals set in this section, the extraction wells will need to be screened at proper intervals. To protect the Colorado River water, PG&E must demonstrate, as part of the design, the ability of the extraction wells to control the plume hydraulics and to capture any potential by-products of treatment. PG&E will also need to provide a contingency plan that**

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			describes actions to be taken to mitigate the failure of capture from these wells prior to implementation and start up. See Table 4-5, Key Elements for Operation and Maintenance Plan.
33.	Page 2-5, River Bank Extraction Wells, Section 2.1.2	"Valve/fittings to facilitate batch addition of well maintenance reagents at the well head"	**The type or range of well head reagents should be discussed.**
34.	Page 2-6, Embayment Extraction Wells	"The Embayment Area lies east of the Topock Compressor Station where the alluvial aquifer extends southward following a depression in the bedrock. The Embayment Area will have approximately four groundwater extraction wells"	**The remedy will need to incorporate new data being collected at the Compressor Station and East Ravine. Data collected to date already shows that the alluvial sequence is thicker than originally expected in the Compressor Station area. The groundwater model will also need to incorporate the new data.**
35.	Page 2-6, East Ravine Extraction Wells	"The East Ravine extraction well network is expected to consist of a series of groundwater extraction wells installed in bedrock along the lower (eastern) end of the East Ravine."	**Although some extraction wells are likely needed at the East Ravine area, it is too soon to specify the specific locations for these wells since additional investigation is on-going.**
36.	Page 2-9, Fresh Water Injection System Routing, Last Sentence	"Along the pipe route, booster stations may be required to meet the operational requirements."	**Please provide additional specificity for a booster station. Perhaps a picture and/or drawing of a typical booster station can be included in the Work Plan for reference.**

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37.	Page 2-10, Fresh Water Injection System Operation, Last sentence.	"The water quality of the production well(s) in Arizona may require pH adjustment to prevent potential scaling on injection wells. In that case, a water conditioning facility may be required."	**Similar to the discussion on booster stations, perhaps a picture and/or drawing of a typical water conditioning facility would assist readers in visualizing this facility. Some level of detail describing this system should also be included in the workplan.**
38.	Page 2-11, Well Maintenance, Rehabilitation, and Replacement	"Wells will be decommissioned in accordance with the California Department of Water Resources standards."	**Revise the cited sentence to read: Wells will be decommissioned in accordance with the California Department of Water Resources standards and an agency approved well decommissioning plan for the Topock site.**
39.	Page 2-11, Well Maintenance, Rehabilitation, and Replacement	"Wells may also be damaged during flooding or storm events."	**Revise the cited sentence to read: Wells may also be damaged and become inoperable due to a number of reasons including vehicular collision, vandalism, loss of equipment down the well as well as during flooding or storm events.**
40.	Page 2-12, Monitored Natural Attenuation	"MNA … could be utilized in the O&M phase after sufficient data are available to evaluate the effectiveness of the in-situ treatment and the hydraulic containment components."	**MNA is a component for remediation only after optimization attempts have been implemented (including installation of additional remedial wells) and that the natural reductive capacity has been shown through monitoring to be effective at the area in question.**
41.	Page 2-12, Monitored	"At the Topock site, attenuation occurs	**Revise the cited sentence to read:**

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	Natural Attenuation, Second Paragraph	naturally in the fluvial sediments near the Colorado River, where…"	**At the Topock site, attenuation occurs naturally in most of the fluvial sediments in the floodplain near the Colorado River, where…**
42.	Page 2-12, Monitored Natural Attenuation, Second Paragraph	"The available data indicate that the fluvial sediments adjacent to and beneath the river have sufficient reducing capacity to reduce all or at least a significant portion of the Cr(VI) plume (CH2M HILL, 2008c; 2009e)."	**Revise the cited sentence to read:The available data indicate that the fluvial sediments adjacent to and beneath the river have sufficient reducing capacity to reduce a significant portion of the Cr(VI) plume (CH2M HILL, 2008c; 2009e).**
43.	Page 2-12, Monitored Natural Attenuation, Second Paragraph, Last Sentence		**Add the following sentence to the end of the paragraph for full disclosure: "reducing materials, however, appears to be absent in the bedrock contaminated area near the Colorado River."**
44.	Page 2-12, Section 2.2.1 Security and Site Access	"locks to prevent authorized access"	**The sentence should be revised… prevent "unauthorized" access.**
45.	Page 2-12 and 13, Section 2.2.1 Security and Site Access	"…as required by EIR mitigation measure…"	**Although DTSC specified that the site access and security plan are to be developed as part of the CMI Work Plan, DTSC acknowledges that the full scope of the plan can not be accomplished without completion of the design. Therefore, DTSC agrees that PG&E can provide conceptual ideas within the CMI Work Plan for the development of a detailed plan as**

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			part of the final design. **Please note that DTSC did encouraged PG&E, as part of the mitigation measures, to work with interested tribes on the development of mitigation procedures so that Tribal input can be properly reflected in the execution of the developed measures which are subject to DTSC review and approval.**
46.	Page 2-13, Section 2.2.3, Management of Remedy Wastewater	"Such maintenance activities will create a wastewater stream that must be managed. Other types of wastewater (smaller volume) will also need to be managed, such as monitoring well sampling purge water, equipment decontamination wastewater, and rainfall that collects in secondary containment. Collectively, these types of wastewater are called remedy wastewater."	**Why would PG&E consider the rainfall cited to be related to the remedy?**
47.	Page 2-13 to 15, Section 2.2.3, Management of Remedy Wastewater	"It is estimated that 3 to 16 million gallons per year of remedy wastewater will be generated."	**As stated, 3 to 16 million gallons translate to 5.7 to over 30 gallons per minute of wastewater generated continuously throughout the year. PG&E should verify this estimate and seek alternative means to avoid significant generation of wastewater from the remediation efforts. Also, discussion on the composition of the wastewater and why the**

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			wastewater cannot be reinjected into the aquifer should be included in the Work Plan.
48.	Page 2-13, Section 2.2.3, Transport of Wastewater		**Would off site disposal at an appropriate facility be an appropriate option for waste water? If so, it should be evaluated.**
49.	Page 2-14, Section 2.2.3, Transport of Wastewater	"It is not anticipated that these will require removal as disposal/reuse options exist that can receive such water – including water from the carbon-amended injection wells in the plume and the existing Compressor Station evaporation ponds."	**Are the PG&E ponds that are regulated by the Water Board permitted to accept non-cooling tower wastewater streams including those discussed in this section?**
50.	Page 2-14 to 15, Disposal/Reuse of Treated Wastewater	2. Discharge to the evaporation ponds, 3. Discharge to Moabi Regional Park Wastewater ponds, 5. Discharge to an infiltration gallery in Bat Cave Wash.	**Would off site disposal at an appropriate facility be an appropriate option for waste water? If so, it should be evaluated.**
51.	Page 2-15, Disposal/Reuse of Treated Wastewater	"An injection gallery in Bat Cave Wash is another potential method to dispose of treated water."	**The Work Plan will need to clearly define what an infiltration gallery is if PG&E wishes it to be considered as part of the project. This newly proposed concept would have to be fully evaluated for potential impacts to: clean soils; existing soils contamination on the surface of the wash and below in the vadose zone; as well as impacts to flora and fauna.**
52.	Page 2-16, section Section 2.3.1 Monitoring Goals and	"When the groundwater remedy is implemented, the current groundwater	**Although DTSC generally agrees with PG&E's stated goals and**

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	Objectives	monitoring programs will be replaced by a new Corrective Measure/ Remedial Action Monitoring Program with the focus of evaluating the performance of the remedy to attain the RAOs and to comply with ARARs."	**objectives for the "new" monitoring program, the purpose should be expanded beyond the four RAOs. DTSC does expect PG&E to refine this CMI work plan to define short term RAOs, which can be part of the design criteria, that would provide short term milestones for measuring remedial performance (example: complete chromium reduction within floodplain in two years while establishing a viable IRZ). With that in mind, DTSC expects the monitoring program to be capable of providing data to determine the plume conditions (i.e., three dimensional snap-shot of contamination within plume, plume changes over time as remedy is implemented, groundwater chemistry changes during remedy, and tracking of potential by products), tracking of other COPCs that were identified in the RFI, as well as data collection for remedy performance determinations. DTSC also agrees with PG&E that compliance monitoring will be necessary to assess the groundwater condition from injection activities.**

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53.	Page 2-16, Compliance Monitoring During Remedy Implementation, 1st paragraph after bullets	While RFI/RI characterization at the site has been focused on both Cr(T) and Cr(VI), future monitoring during the remediation will be focused on Cr(VI).	**As stated, the focus of the monitoring seems too limiting to only Cr(VI). To properly evaluate the goals and purpose, PG&E will need to monitor for a suite of constituents including all COPCs and potential by-products of remediation.**
54.	Page 2-16, Compliance Monitoring During Remedy Implementation	"While RFI/RI characterization at the site has been focused on both Cr(T) and Cr(VI), future monitoring during the remediation will be focused on Cr(VI)."	**Periodic monitoring for total chromium will be required as RAOs / MCLs are based on total chromium.**
55.	Page 2-16, Compliance Monitoring During Remedy Implementation	"Water quality monitoring in groundwater outside the plume will focus on analysis for Cr(VI), as well as in-situ byproducts (arsenic and manganese)."	**Water quality monitoring outside the plume will also consist of periodic monitoring of general minerals, total metals, isotopes, et al. to evaluate overall plume movement.**
56.	Page 2-16, Compliance Monitoring During Remedy Implementation	"Concentrations in groundwater outside the plume will be evaluated against background concentrations (32 parts per billion [ppb] for Cr[VI] and 24 ppb for arsenic)."	**The Work Plan must also acknowledge that metals/general minerals/etc., will have to be evaluated via intra well comparisons where data from a single well are evaluated overtime (e.g., time series graphs) and that compliance wells will be compared to individual trigger levels developed for each well as currently done for the IM-3 performance monitoring. Therefore, baseline conditions will**

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			have to be established for all wells prior to system start up. PG&E will need to sequence new well installation and baseline groundwater sampling early in the process. The baseline issue should be documented in the Work Plan. **Site trends over specific areas could be compared to background concentrations, but area specific concentrations (e.g., mean arsenic, manganese, and chromium floodplain concentrations) should also be evaluated due to acknowledged limitations associated with the regional background study. This concept should be added to the Work Plan.**
57.	Page 2-16, Compliance Monitoring During Remedy Implementation	”River monitoring may also be conducted to ensure that concentrations remain below numeric surface water quality criteria. Concentrations above water quality criteria attributable to contributions from the Topock site will result in contingency activities, such as system modifications.”	**Revise the cited sentence as follows: River monitoring will also be conducted to ensure that concentrations remain below numeric surface water quality criteria and river background levels. Concentrations attributable to contributions from the Topock site will result in contingency activities, such as system modifications.**

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58.	Page 2-16/17, Compliance Monitoring During Remedy Implementation	"Most compliance monitoring would likely occur in wells around the perimeter of the plume, particularly along the western and northern margins where the fresh water injection wells are located."	**DTSC reserves comment on the compliance monitoring network until the remedy and monitoring program are no longer conceptual.**
59.	Page 2-17, Compliance Monitoring During Remedy Implementation	"Inside the plume, the monitoring program is focused on measuring progress towards attainment of RAOs, and therefore will primarily be measuring changes in Cr(VI) concentrations."	**See comments on Table 2-1 below. Revision to text is requested.**
60.	Page 2-17, Compliance Monitoring During Remedy Implementation	"…compliance monitoring inside the perimeter of the plume will be less frequent than monitoring outside the perimeter of the plume, likely on an annual or bi-annual basis."	**DTSC may agree with this frequency when the remedial system is in steady state and hydraulics and geochemical fate and transport is better understood. In the beginning, DTSC expects monitoring at higher frequencies to ensure proper understanding of effects from remedy implementation.** **DTSC will be better able to address this comment after PG&E establishes a defined, non-conceptual remedy and monitoring program that will be based on updated modeling and anticipated flow rates and contaminant transport estimates.**
61.	Page 2-17, Compliance Monitoring During Remedy Implementation	"Unlike the areas outside the plume, increases in concentrations inside the plume will not result in contingency activities because of the	**The cited sentence will need to be revised because there will be situations were monitoring inside,**

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		ICs."	**but along the edge of the plume (e.g., river's edge) could call for some contingency activities.**
62.	Table 2-1	Primary Constituents, Frequency and Monitoring Objectives	**DTSC disagrees with constituents listed for compliance monitoring. In order to define the effectiveness of the remedy and track the generation and conversion of by products, redox-sensitive species will be required inside the plume. Why are there no constituents measured in process control monitoring at the west and north of fresh water injection wells and East Ravine? DTSC also does not see the monitoring of Molybdenum, Nitrate, and Selenium as other COCs stated in the RFI, CMS and EIR.** **In general, DTSC disagrees with the frequencies listed. Frequency can be adjusted based on operational phases, but more frequent during remedy startup is required. Also, additional monitoring objectives will need to be defined. Therefore, additional primary constituents or general chemistry, such as TDS, ORP, isotopes, and pH, may need to be added or modified through**

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			out the table **DTSC will be better able to address the framework and frequency for monitoring after PG&E establishes a defined, nonconceptual remedy and monitoring program that will be based on updated modeling and anticipated flow rates and contaminant transport estimates.** **Monitoring Objectives should include evaluating changes in plume distribution; evaluating distribution of other COCs (Mo, N, and Se); monitoring changes in geochemistry. PG&E will need to develop both short and long term goals.**
63.	Page 2-18, Compliance Monitoring During Remedy Implementation	"It is anticipated that non-certified lab analysis will also be a component of process control monitoring during the groundwater remedy."	**PG&E will need to specify which analyses will be performed by on-site non-certified labs and for what purpose.**
64.	Page 2-18, Evolution of Monitoring Programs Over Time	"Once the floodplain is clean, it may be possible to turn off the pumping wells near the river and the carbon-amended injection wells. Changes such as this would result in changes in the monitoring program. Eventually, it will be determined that the active part of the remedial action is no longer needed."	**PG&E will need to develop upfront criteria for major changes to the remedy. For instance, PG&E would need to consider if shutting down pumping along the river would result in a significant increase in time for the remedy to reach RAOs.**
65.	Page 3-1, First	"The additional information will be	**Please use "decommissioning"**

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	Paragraph	collected for various reasons such as to further document baseline conditions prior to remedy implementation, provide information as needed for design and construction planning, and provide information to evaluate remedy performance during future operational and closure phases."	**instead of "closure" to avoid confusion in permitting status under RCRA.** **Furthermore, PG&E should highlight up front the need to collect additional information for the East Ravine. At a minimum, revise this sentence… "**provide information as needed for **design and construction planning, especially in the East Ravine area,…"**
66.	Page 3-1, Section 3.1 Hydrogeology and Plume Dimensions	"…during the groundwater remedy design, construction, operation, and post-closure phases."	**Same as comment above. Do not use closure terminologies. In this case, use "post remediation" phases.**
67.	Page 3-1, Section 3.1.1 Site Characteristics	"The geologic and hydrogeologic conditions of the site described below are discussed in greater detail in the RFI/RI Volume 2 Report (CH2M HILL, 2009a), the Volume 2 Addendum (CH2M HILL, 2009b), the Summary of Findings Associated with the East Ravine Groundwater Investigation included in Appendix A of the CMS/FS (CH2M HILL, 2009c), and ongoing monitoring reports."	**The cited section must acknowledge that additional data are currently being collected for the East Ravine and Topock Compressor Station Areas and will be utilized in developing the remedy.**
68.	Page 3-4, Section 3.1.1 Site Characteristics, Chromium Plume Dimensions, December 2010	"Based on current site characterization data, the existing dimensions of the plume exceeding natural background levels underlie an area that is approximately 175 acres, including alluvium and bedrock."	**The cited sentenced should be modified to as follows: "…exceeding natural alluvial background levels …" as background values for bedrock have not been determined.**

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69.	Page 3-5, Section 3.1.3 Additional Data During Groundwater Remedy Construction	"During the initial construction of the groundwater remedy, wells will be installed in some areas where there are currently few or no existing wells."	**Revised the cited sentence as follows, "During the initial construction of the groundwater remedy, wells will be installed in areas where they are needed." New wells may be installed adjacent to existing wells for a number of reasons including vertical definition and aquifer assessment.** **The following sentence should also be revised in a similar fashion.**
70.	Page 3-6, Section 3.1.3 Additional Data During Groundwater Remedy Construction	Information to be collected from these wells will include geologic logging, depth to groundwater, analytical constituent concentrations, and possibly aquifer properties.	**Include geophysical logging to the information that may be collected from wells.**
71.	Page 3-6, Section 3.1.4, Additional Data During Groundwater Remedy Operation and Closure		**See comments above on use of closure and post closure terminologies.**
72.	Page 3-6, Section 3.1.4, Additional Data During Groundwater Remedy Operation and Closure	Implementation of the Corrective Measure/Remedial Action Monitoring Program. Data collected from monitoring wells for RAO attainment during operation will be for Cr(VI) concentrations. In addition, measurements of groundwater quality for in-situ treatment byproducts and hydraulic measurements will be collected in select areas of the site. DTSC and DOI have also directed that nitrate, molybdenum, and selenium	**See comments on Table 2-1 and pages 2-16 to 2-18. Text from this section (Section 3) should correspond to that contained in Section 2.**

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		concentrations in groundwater be monitored periodically throughout the remediation process.	
73.	Page 3-6, Section 3.1.4, Additional Data During Groundwater Remedy Operation and Closure	"Additional site characterization information from wells installed during operation, closure, and postclosure phases will include geologic logging, depth to groundwater, analytical constituent concentrations, and possibly aquifer properties."	**Include geophysical logging to the information that may be collected from wells.**
74.	Page 3-9, Second bullet	"Additional information will be gathered during the design phase on capacities of various disposal/reuse options for treated wastewater"	**PG&E has mentioned treated waste water in several locations in the work Plan. However, thus far, PG&E has not described the treatment process or the infrastructures and logistics for such treatment in detail. Figure 2-3 (schematic diagram) appears to be the same process as the current IM treatment plant. Is this what PG&E is considering? Additional information is needed.**
75.	3.2.5 Surface Water and Wetlands	"…the Final Human and Ecological Risk Assessment of Groundwater Impacted by Activities at SWMU 1/ AOC 1 and SWMU 2 concluded that the potential transport of constituents in groundwater to the Colorado River represents an insignificant transport pathway (ARCADIS, 2009)."	**For completeness, the paragraph should mention that the risk assessment did not evaluate the potential transport of groundwater contamination in bedrock in the East Ravine area to surface water.**
76.	Page 4-1, section 4.0 Schedule and Future Documents, First Paragraph	"The implementation of the groundwater remedy consists of several phases, including design, construction, O&M, closure, post-closure, and	**Replace closure and post-closure wording.**

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		decommissioning of remedial facilities."	
77.	Page 4-1, section 4.0 Schedule and Future Documents, First Paragraph	"Multiple activities and documents will occur during each phase of the project and any one phase may overlap with other phases of the project; for example, some parts of the remedy may be in start-up while other parts are under construction."	**DTSC only envisions some construction and decommissioning activities to overlap with operational activities. There should not be any overlap of other phases of the project prior to design approval.**
78.	Page 4-1, section 4.0 Schedule and Future Documents, First Paragraph	"At this early stage of project implementation, a timeline for the latter phases of the project is not meaningful."	**DTSC disagrees with this statement. Like all project planning, an initial project schedule of all phases allows for better planning and tracking of short term goals. DTSC agrees that future changes in the schedule during implementation will be likely, but PG&E should be considering the project in whole and propose short term goals (short term RAOs) as suggested in comments above.**
79.	Page 4-10, Section 4.3 Key Documents During the Construction Phase	"The Corrective Measure/Remedial Action Construction Completion Report may include the following elements:"	**Change "may" to "will" in the cited sentence. Do the same for Section 4.5 as well.**
80.	Tables 4-1, 4-2, 4-3, 4-4, and 4-5		**These tables provide good summaries of the documents required under its respective programs and requirements (CACA, Consent Decree, and EIR MMRP). DTSC understands that PG&E is combining documents with similar functions or**

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			requirements into a single submission to improve review efficiencies. However, to ensure that all requirements are considered and will be submitted in future documents, PG&E should provide a cross reference in Tables 4-1 and 4-2 of where in the combined process (Tables 4-3 and 4-5) will each of the requirements be fulfilled. Please also propose a schedule for submission of the documents associated with these requirements.
81.	Section 4.2 Schedule of Key Documents During Design Phase and Table 4-3		**As part of remedy approval, PG&E is required to submit to DTSC an update of the remedy cost estimate with each phase of the design refinement and annually thereafter. PG&E should note this requirement in the CMI/ RD Work Plan.**
82.	Table 4-5, Construction/ RA work plan	Construction Contingency Plan	**Although a contingency plan for construction related changes is a good idea, PG&E should prepare an operational contingency plan which anticipates various failure modes under operation and maintenance (e.g. lack of plume capture, plume or by-product migration beyond current plume boundaries).**

Comment Number	Location in CMI/ RD Work Plan	Reference Text	Comment
83.	Page 4-11, Section 4.4, last paragraph, Section 4.5 and 4.6.	"… closure of infrastructure determined unnecessary for future operations, and/or partial closure…"	**Please refrain from use of closure, partial closure and post closure language due to RCRA regulatory implications of these terminologies.**
84.	Page 5-1, Section 5.0, bullet	"Ensure that the geographic location of the target remediation area does not permanently expand following completion of the remedial action."	**The Work Plan should note (in another section) that expanding the plume boundary at any time during remedy implementation will be avoided if possible.**
85.	Page 5-1, Section 5.0, last paragraph	"The goals of the IM are different from the RAOs because the RAOs were developed based on the conclusions of the RFI/RI, risk assessment, and ARARs identification, which were not complete at the time the IM objectives were defined in 2004."	**The comparison of the intent and goal of the IM from final remedy is irrelevant. PG&E is correct that the purpose of the IM was to stabilize the hexavalent chromium plume and to keep it away from the Colorado River while the final remedy can be properly evaluated and selected.**
86.	Page 5-4, Section 5.2, Example 2	"During this period of IRZ construction, which will likely extend over many months, it may not be possible to continuously maintain the required gradient control metrics in all of the IM well pairs. There would still be landward gradients across most of the floodplain, but injection or extraction in the IRZ recirculation wells may affect water levels in one or more of the designated gradient measurement well pairs."	**DTSC agrees with PG&E that the IM metric will likely be incompatible to the final remedy. Given that understanding, how can PG&E ensure that there would still be landward gradient when "significant quantity" of water with amendment will be injected along National Trails Highway? This statement may not be true without proper groundwater modeling and monitoring.**

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87.	Page 5-5, Section 5.2, Example 5	"Once carbon has been distributed along the IRZ, it will be necessary to allow some time for the microbes to digest the carbon and create the geochemical reducing conditions needed to remove the chromium. During this time, it is desirable to have a minimal flow of groundwater across the IRZ so that the carbon substrate remains in the target treatment zone rather than being pulled away downgradient. The period of time required for complete development of the IRZ following carbon injection may be weeks to months. During this time, pumping from TW-3D would adversely affect the development of the IRZ by pulling un-amended water through the target treatment zone, particularly in the center portion of the IRZ line. This could result in incomplete distribution of carbon, and therefore only partial treatment, in the central portion of the IRZ, where some of the highest concentrations of Cr(VI) are found in groundwater."	**DTSC agrees with PG&E's assessment that the operation of the remedial system will require careful planning in a stepwise fashion. Since PG&E agrees in Section 5.3 that a detailed implementation plan with several discreet steps for the remedial system startup is necessary. PG&E should layout the performance goals for each step that must be achieved prior to the start up of the subsequent step. PG&E must also consider the flow path of the by products as a result of the geochemical changes and provide an equally robust monitoring plan to ensure protection of the river water as well as control of the plume hydraulics during startup. DTSC advises PG&E to provide these procedures in concepts for review as soon as possible and should be considered in the preliminary design phase.**
88.	Page 5-5, Section 5.2, Example 6	"The IM treatment process is not designed to remove carbon compounds in the extracted water. Carbon compounds in the IM water could increase fouling of the IM extraction and injection wells, potentially reducing the	**DTSC does not disagree with PG&E's assessment that fouling is a real possibility. However, if PG&E is correct in assuming that the carbon compounds in the extracted water can increase**

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		effectiveness and capacity of the IM system."	**fouling of the extraction and injection wells, please discuss what steps PG&E will take to eliminate this issue when the entire premise of the selected remedy is to use carbon amendment, extraction and injection wells to effectively remove soluble mass of hexavalent chromium in the groundwater. Please note that PG&E's recommended remedy included extraction by the river's edge which may contain carbon amendment and then injection of amended water to the west of the plume.**
89.	Page 5-6, Section 5.4	"Other IM monitoring programs (e.g., PMP, CMP) will be terminated when the agencies determine that the IM, and therefore the IM monitoring programs, is no longer required; similarly, existing contingency plans for the injection well field area, the floodplain area and the Colorado River initiated during the IM will be terminated and replaced by contingency plans appropriate for the groundwater remedy."	**Similar to PG&E's discussion on transitioning between IM and final remedy, DTSC will likely require PG&E to "transition" the monitoring program from IM to final remedy compliance monitoring. Although this concept is appropriate, agencies must review and concur with PG&E's concepts on the final remedy monitoring program before such transition can happen. Please note, as stated above, the monitoring program will likely be tailored to each phase of the project implementation plan**

Comment Number	Location in CMI/ RD Work Plan	Reference Text	Comment
			since the monitoring needs will likely change with the changing geochemistry.
90.	Page 5-6, Section 5.5	"…IM infrastructure that are not incorporated into the groundwater remedy are expected to be decommissioned following determination by DOI and DTSC that the facilities are not needed to meet the RAOs."	**Please note that in conformance with the remedy decision documents, the determination that the IM treatment plan can be decommissioned will be tied to the finding that the remedy is operating properly and successfully, not if the IM facilities are needed to meet RAOs for the final remedy. The cited text should be revised.**
91.	Page 5-7, Second Paragraph	"This effort will involve reviewing equipment use and historical spills or leaks to identify potential waste disposal or salvage options."	**Please be reminded that DTSC had communicated with PG&E that all facilities used for interim measures are to be considered SWMUs under Corrective Action and are subject to proper evaluation under RCRA standards. Soil sampling beneath and around the IM3 treatment plant will is required in addition to concrete wipe and chip sampling for confirmation. Soil sampling should be included in the proposed decommissioning plan.**
92.	Page 5-7, Second or Third Paragraph		**Text should be revised to acknowledge the potential for soil waste to be generated and require disposal/treatment.**
93.	Page 5-7, Section 5.5.2	"The two IM injection wells (IW-02 and IW-	**Wells decommissioned will also**

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		03) and four extraction wells (PE-1, TW-2D, TW-2S, and TW-3D) will be decommissioned using procedures required by San Bernardino County and the California Department of Water Resources."	**need to follow an approved decommissioning plan. The Work Plan should indicate if the wells cited are currently planned to be reused in the remedy.**
94.	Page 5-7, Section 5.5.2	"Demolition of brine storage and loading facilities on the MW-20 bench will involve procedures similar to tank demolition at the treatment plant building. Pipelines will be decontaminated as appropriate."	**Similar to the IM3 treatment plant, DTSC considers the MW-20 bench to be a RCRA SWMU under corrective action and should be investigated due to past spills. In addition, since PG&E is contemplating on the reuse of the MW-20 bench for the final remedy, proper sampling and protection of onsite workers should be considered during final remedy construction activities.**
95.	Page 5-7, Section 5.5.2	"Subsurface pipelines from the extraction wells to the treatment plant will likely be abandoned in place following decontamination unless the regulatory agencies or landowner requires removal."	**Soil samples from below potential or known pipeline leaks are requested and should be planned in the revised Work Plan.**
96.	Page 6-1 to 6-4, Section 6		**PG&E should submit a proposed schedule for the activities included in the chapter. Furthermore, PG&E should specify what level of stakeholder and agency involvement is anticipated with these activities.**
97.	Groundwater Model Updates, Pages 6-2 to 6-4		**What type of model calibration will be associated with the changes**

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			proposed for the groundwater flow models?
98.	6.3.2 Geochemical Evaluation	"The input parameters will be developed from the in-situ pilot test data set collected in the floodplain." "The geochemical model will be calibrated against the existing floodplain data set."	**Modeling of amended injection wells will occur exclusively in the upland, oxidizing portion of the aquifer. How will the model for the upland area be calibrated?**
99.	Page 7-5, section 7.3.7 Continuous Optimization of Processes and Resources, Third Bullet	Consideration of detailed design specifications vs. performance-based specifications	**PG&E did not provide any substantive proposal on the reference issue beyond the stated advantage and disadvantage of detailed design specification. What is PG&E's intention regarding this matter?**
100.	Figure 1-2, Groundwater Remedy Project Area Comment also applies to Figure 5-1	"The outline of Cr(VI) depicted as greater than 32 µg/L near or under the Colorado River is 80 feet below the bottom elevation of the Colorado River."	**The cited text included in the plume boundary legend should be deleted as it is not true within the East Ravine area adjacent to the river.**
101.	Figure 2-1a, Conceptual Remedy Site Plan California Portion		**The CMI should indicate why it is necessary to have freshwater and wastewater pipelines located in Bat Cave Wash. Are these lines redundant and can the waters be transported along the other proposed segments?**
102.	**Figure 2-3, Conceptual remedy wastewater treatment schematic diagram**	**"Solids for Disposal" and "Water Storage"**	**Should the "Water Storage" box be renamed to "Untreated Wastewater Storage"?**

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